PB90-234345

Best Demonstrated Available Technology (BDAT) Background Document for U and P Wastes and Multi-Source Leachate (F039) Volume B. U and P Wastewaters and Nonwastewaters with Methods of Treatment as Treatment Standards

Versar, Inc., Springfield, VA

Prepared for:

Environmental Protection Agency, Washington, DC

8 May 90

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO.
EPA/530-SW-90-060G

2.

3.
PB90-234345

4. Title and Subtitle
FINAL BEST DEMONSTRATED AVAILABLE TECHNOLOGY (BDAT) BACKGROUND DOCUMENT FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) VOLUME B: U & P WASTEWATERS AND NONWASTEWATERS WITH METHODS OF TREATMENT AS TREATMENT STANDARDS

5. Report Date
MAY 1990

6.

7. Author(s)
KINCH/JONES

8. Performing Organization Rept. No

9. Performing Organization Name and Address

U.S. EPA
Office of Solid Waste
401 M. Street SW
Washington, DC 20460

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered
BACK.DOCU. 5/90

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This background document provides the agency's rationale an dtechnical support for developing treatment standards for those U and P wastes with methods of treatment at the BDAT treatment standards. These standards are applicable to the wastes as listed in 40 CFR 261.33(e) and (f) as well as to any wastes generated by the management or treatment of the listed waste. Treatment standards are specified for both nonwastewater and wastewater forms of each listed hazardous waste. Wastewaters are defined as wastes containing less than 1% (weight basis) toal suspended solids and less than 1% (weight basis) total organic carbon (TOC). Wastes not meeting hte wastewater definition must comply with treatment standards for nonwastewaters.

17. Document Analysis a. Descriptors

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

18. Availability Statement
RELEASE UNLIMITED

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page)
UNCLASSIFIED

21. No. of Pages
215

22. Price
0

(See ANSI-Z39.18)

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)

EPA/530-SW-90-060G

PB90-234345

FINAL

BEST DEMONSTRATED AVAILABLE TECHNOLOGY (BDAT)
BACKGROUND DOCUMENT
FOR
U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)

VOLUME B:

U & P WASTEWATERS AND NONWASTEWATERS WITH METHODS OF TREATMENT AS TREATMENT STANDARDS

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May 8, 1990

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1.0 INTRODUCTION

1.1 Regulatory Background

Section 3004(m) of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) on November 8, 1984, requires the U.S. Environmental Protection Agency (EPA or the Agency) to promulgate treatment standards for certain hazardous wastes based on the Best Demonstrated Available Technology (BDAT) for those wastes. More than 500 of these hazardous wastes were listed as of December 1988 (see Title 40, Code of Federal Regulations, Part 261 (40 CFR Part 261)). The Agency divided the listed hazardous wastes into five groups. The wastes in each group were examined to determine whether further land disposal is protective of human health and the environment (see 40 CFR Part 268). The five groups and their respective dates of promulgation of treatment standards are:

• Solvent and dioxin wastes	November 7, 1986
• "California List" wastes	July 8, 1987
• "First Third" wastes	August 8, 1988
• "Second Third" wastes	June 8, 1989
• "Third Third" wastes	On or before May 8, 1990

Several wastes included in this schedule were regulated ahead of schedule, and several wastes in the "First Third" or "Second Third" group of wastes were deferred to the "Third Third" group of wastes. Treatment standards for the Third Third wastes will become effective no later than May 8, 1990. On and after this date, wastes regulated in the "Third Third" rulemaking will have to comply with applicable treatment standards prior to "land disposal" as defined in 40 CFR Part 268.

This background document provides the Agency's rationale and technical support for developing treatment standards for those U and P wastes with methods of treatment as the BDAT treatment standards. These standards are applicable to the wastes as listed in 40 CFR 261.33(e) and (f) as well as to any wastes generated by the management or treatment of the listed waste. Treatment standards are specified for both nonwastewater and wastewater forms of each listed hazardous waste. For the purpose of determining the applicability of the treatment standards, wastewaters are defined as wastes containing less than 1% (weight basis) total suspended solids[1] and less than 1% (weight basis) total organic carbon (TOC). Wastes not meeting the wastewater definition must comply with treatment standards for nonwastewaters.

The Agency's legal authority and promulgated methodology for establishing treatment standards and the petition process for requesting a variance from the treatment standards are summarized in EPA's Methodology for Developing BDAT Treatment Standards (Reference 1).

U wastes include discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container and inner liner residues, and spill cleanup residues, including contaminated water, soil, or debris, that are identified as toxic wastes. P wastes include discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container and inner liner residues, and spill cleanup residues, including contaminated water, soil, or debris, that are identified as acutely hazardous wastes. Section 2.0 discusses the definition of U and P wastes in greater detail.

1.2 User's Guide to the Three-Volume U and P Waste and Multi-Source Leachate (F039) Background Document Set

In the interest of clarity, the Agency has reorganized the "Third Third" background documents that were prepared for proposal of the Third Third Rule. Multi-source leachate (F039) and the majority of the organic U and P waste codes addressed in the Third Third Proposed Rule are now covered in a five-volume set of background documents.

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[1] The term "total suspended solids" (TSS) clarifies EPA's previously used terminology of "total solids" and "filterable solids." Specifically, total suspended solids are measured by Method 209c (Total Suspended Solids Dried at 103 to 105°C) in Standard Methods for the Examination of Water and Wastewater (Reference 2).

The five-volume background document set is organized as follows:

- Volume A - Wastewater forms of organic U and P wastes and multi-source leachate (F039) for which there are concentration-based treatment standards;
- Volume B (this document) - U and P wastewaters and nonwastewaters with methods of treatment as treatment standards;
- Volume C - Nonwastewater forms of organic U and P wastes and multi-source leachate (F039) for which there are concentration-based treatment standards.
- Volume D - Reactive U and P wastes and nonwastewaters with methods of treatment as treatment standards; and
- Volume E - Gases.

Volumes A, B, and C each contain a set of cross-referenced treatment standard tables which are intended as a guide to help the reader locate a particular waste code or constituent and its treatment standard. These tables list the volume in which the nonwastewater and wastewater forms of each waste code and multi-source leachate (F039) constituent are discussed. Table 1-1 in each volume is organized by waste code; Table 1-2 in each volume is organized alphabetically by the common name of the regulated constituent. (All tables are presented at the end of this section.)

1.3 Summary of Contents: Volume B

This background document provides the Agency's rationale and technical support for developing treatment standards for the organic U and P wastes for which concentration-based treatment standards could not be developed. The waste codes included in this background document are listed in Table 1-3.

Section 2.0 presents available waste characterization data, provides a discussion of the industries and processes that generate the U and P wastes included in this document, and provides the determination of the waste treatability groups.

Section 3.0 includes a discussion of the issues preventing the Agency from developing and promulgating concentration-based treatment standards for the U and P waste codes included in this document. Developing concentration-based treatment standards is not feasible for the majority of these U and P wastes due to difficulties in quantifying the particular U or P waste constituents of concern in hazardous waste matrices. Quantification difficulties are due to the lack of effective SW-846 analytical methods, the lack of commercially available analytical reagent standards, the instabilities of the constituents in water, and multiple chemical identity. Some of the U and P waste codes included in this document may be amenable to quantification in hazardous waste matrices; however, as discussed in Section 3.0, treatment standards were developed as methods of treatment due to problems encountered in collecting representative treatment performance data.

Sections 4.0 and 5.0 present EPA's methodology and rationale for identifying as BDAT methods of treatment for the U and P waste codes included in this document. BDAT for nonwastewater forms of these wastes is incineration. BDAT for wastewater forms of these wastes is any one of the following treatment trains:

- Wet air oxidation followed by carbon adsorption;
- Chemical oxidation followed by carbon adsorption; or
- Incineration.

Tables 1-1 and 1-2 list the BDAT treatment standards for all of the Third Third organic U and P wastes, including those discussed in this document.

Section 6.0 acknowledges the persons involved in developing regulations for these wastes. Section 7.0 presents references cited in this document. Appendix A lists the facilities that may generate these U and P wastes and the approximate number and geographic distribution of facilities that may be affected by land disposal restrictions of these wastes. Appendix B presents the chemical structures for the U and P constituents covered in the five-volume background document set. Appendix C presents the problems encountered in calculating concentration-based treatment standards for certain U and P constituents. These problems precluded promulgation of numerical standards, and as a result, methods of treatment were set as BDAT treatment standards for these waste codes.

Table 1-1
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
F039	Multi-Source Leachate Constituents - Refer to Table 1-2 for Treatment Standards for each Regulated Constituent				
P001	Warfarin (>0.3%)	B	BDAT	B	BDAT-FS
P002	1-Acetyl-2-thiourea	B	BDAT	B	BDAT
P003	Acrolein	A	0.29	B	BDAT-FS
P004	Aldrin	A	0.021	C	0.066
P005	Allyl alcohol	B	BDAT	B	BDAT-FS
P007	5-Aminomethyl-3-isoxazolol	B	BDAT	B	BDAT
P008	4-Aminopyridine	B	BDAT	B	BDAT
P014	Thiophenol (Benzenethiol)	B	BDAT	B	BDAT
P016	Bis(chloromethyl)ether	B	BDAT	B	BDAT
P017	Bromoacetone	B	BDAT	B	BDAT
P018	Brucine	B	BDAT	B	BDAT
P020	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	A	0.066	C	2.5
P022	Carbon disulfide	A	0.014	B	BDAT
P023	Chloroacetaldehyde	B	BDAT	B	BDAT
P024	p-Chloroaniline	A	0.46	C	16
P026	1-(o-Chlorophenyl)thiourea	B	BDAT	B	BDAT
P027	3-Chloropropionitrile	B	BDAT	B	BDAT
P028	Benzyl chloride	B	BDAT	B	BDAT
P034	2-Cyclohexyl-4,6-dinitrophenol	B	BDAT	B	BDAT
P037	Dieldrin	A	0.017	C	0.13
P042	Epinephrine	B	BDAT	B	BDAT
P045	Thiofanox	B	BDAT	B	BDAT
P046	alpha,alpha-Dimethylphenethylamine	B	BDAT	B	BDAT
P047	4,6-Dinitro-o-cresol	A	0.28	C	160
P047	4,6-Dinitro-o-cresol salts	B	BDAT	B	BDAT
P048	2,4-Dinitrophenol	A	0.12	C	160
P049	2,4-Dithiobiuret	B	BDAT	B	BDAT
P050	Endosulfan I	A	0.023	C	0.066
P050	Endosulfan II	A	0.029	C	0.13
P050	Endosulfan sulfate	A	0.029	C	0.13
P051	Endrin	A	0.0028	C	0.13
P051	Endrin aldehyde	A	0.025	C	0.13
P054	Aziridine	B	BDAT	B	BDAT
P057	Fluoroacetamide	B	BDAT	B	BDAT
P058	Fluoroacetic acid, sodium salt	B	BDAT	B	BDAT
P059	Heptachlor	A	0.0012	C	0.066
P059	Heptachlor epoxide	A	0.016	C	0.066
P060	Isodrin	A	0.021	C	0.066
P064	Isocyanic acid, methyl ester	B	BDAT	B	BDAT
P066	Methomyl	B	BDAT	B	BDAT
P067	2-Methylaziridine	B	BDAT	B	BDAT
P069	Methyllactonitrile	B	BDAT	B	BDAT
P070	Aldicarb	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

Waste Code	Regulated Constituents	Wastewater		Nonwastewater	
		Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
P072	1-Naphthyl-2-thiourea	B	BDAT	B	BDAT
P075	Nicotine and salts	B	BDAT	B	BDAT
P077	p-Nitroaniline	A	0.028	C	28
P082	N-Nitrosodimethylamine	A	0.40	B	BDAT
P084	N-Nitrosomethylvinylamine	B	BDAT	B	BDAT
P088	Endothall	B	BDAT	B	BDAT-FS
P093	N-Phenylthiourea	B	BDAT	B	BDAT
P095	Phosgene	B	BDAT	B	BDAT
P101	Ethyl cyanide (Propanenitrile)	A	0.24	C	360
P102	Propargyl alcohol	B	BDAT	B	BDAT-FS
P108	Strychnine and salts	B	BDAT	B	BDAT
P116	Thiosemicarbazide	B	BDAT	B	BDAT
P118	Trichloromethanethiol	B	BDAT	B	BDAT
P123	Toxaphene	A	0.0095	C	1.3
U001	Acetaldehyde	B	BDAT	B	BDAT
U002	Acetone	A	0.28	C	160
U003	Acetonitrile	A	0.17	B	BDAT
U004	Acetophenone	A	0.010	C	9.7
U005	2-Acetylaminofluorene	A	0.059	C	140
U006	Acetyl chloride	B	BDAT	B	BDAT
U007	Acrylamide	B	BDAT	B	BDAT
U008	Acrylic acid	B	BDAT	B	BDAT-FS
U009	Acrylonitrile	A	0.24	C	84
U010	Mitomycin C	B	BDAT	B	BDAT
U011	Amitrole	B	BDAT	B	BDAT
U012	Aniline	A	0.81	C	14
U014	Auramine	B	BDAT	B	BDAT
U015	Azaserine	B	BDAT	B	BDAT
U016	Benz(c)acridine	B	BDAT	B	BDAT-FS
U017	Benzal chloride	B	BDAT	B	BDAT
U018	Benz(a)anthracene	A	0.059	C	8.2
U019	Benzene	A	0.14	C	36
U020	Benzene sulfonyl chloride	B	BDAT	B	BDAT
U021	Benzidine	B	BDAT	B	BDAT
U022	Benzo(a)pyrene	A	0.061	C	8.2
U024	Bis(2-chloroethoxy)methane	A	0.036	C	7.2
U025	Bis(2-chloroethyl)ether	A	0.033	C	7.2
U026	Chlornaphazine	B	BDAT	B	BDAT
U027	Bis(2-chloroisopropyl)ether	A	0.055	C	7.2
U029	Bromomethane (Methyl bromide)	A	0.11	C	15
U030	4-Bromophenyl phenyl ether	A	0.055	C	15
U031	n-Butyl alcohol	A	5.6	C	2.6
U033	Carbonyl fluoride	B	BDAT	B	BDAT
U034	Trichloroacetaldehyde (Chloral)	B	BDAT	B	BDAT
U035	Chlorambucil	B	BDAT	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

Waste Code	Regulated Constituents	Wastewater Document	Wastewater Treatment Standard (mg/l) *	Nonwastewater Document	Nonwastewater Treatment Standard (mg/kg) **
U036	Chlordane (alpha and gamma)	A	0.0033	C	0.13
U037	Chlorobenzene	A	0.057	C	5.7
U038	Chlorobenzilate	A	0.10	B	BDAT
U039	p-Chloro-m-cresol	A	0.018	C	14
U041	1-Chloro-2,3-epoxypropane (Epichlorohydrin)	B	BDAT	B	BDAT
U042	2-Chloroethyl vinyl ether	B	BDAT	B	BDAT
U043	Vinyl chloride	A	0.27	C	33
U044	Chloroform	A	0.046	C	5.6
U045	Chloromethane (Methyl chloride)	A	0.19	C	33
U046	Chloromethyl methyl ether	B	BDAT	B	BDAT
U047	2-Chloronaphthalene	A	0.055	C	5.6
U048	2-Chlorophenol	A	0.044	C	5.7
U049	4-Chloro-o-toluidine hydrochloride	B	BDAT	B	BDAT
U050	Chrysene	A	0.059	C	8.2
U051	Creosote - Lead	A	0.28	C	0.51 @
U051	Creosote - Naphthalene	A	0.059	C	3.1
U051	Creosote - Pentachlorophenol	A	0.089	C	7.4
U051	Creosote - Phenanthrene	A	0.059	C	3.1
U051	Creosote - Pyrene	A	0.067	C	8.2
U051	Creosote - Toluene	A	0.080	C	28
U051	Creosote - Xylenes (total)	A	0.32	C	28
U052	Cresol (m- and p- isomers)	A	0.77	C	3.2
U052	o-Cresol	A	0.11	C	5.6
U053	Crotonaldehyde	B	BDAT	B	BDAT-FS
U055	Cumene	B	BDAT	B	BDAT-FS
U056	Cyclohexane	B	BDAT	B	BDAT-FS
U057	Cyclohexanone	A	0.36	B	BDAT-FS
U059	Daunomycin	B	BDAT	B	BDAT
U060	o,p'-DDD	A	0.023	C	0.087
U060	p,p'-DDD	A	0.023	C	0.087
U061	o,p'-DDD	A	0.023	C	0.087
U061	p,p'-DDD	A	0.023	C	0.087
U061	o,p'-DDE	A	0.031	C	0.087
U061	p,p'-DDE	A	0.031	C	0.087
U061	o,p'-DDT	A	0.0039	C	0.087
U061	p,p'-DDT	A	0.0039	C	0.087
U062	Diallate	B	BDAT	B	BDAT
U063	Dibenz(a,h)anthracene	A	0.055	C	8.2
U064	1,2,7,8-Dibenzopyrene	B	BDAT	B	BDAT-FS
U066	1,2-Dibromo-3-chloropropane	A	0.11	C	15
U067	1,2-Dibromoethane (Ethylene Dibromide)	A	0.028	C	15
U068	Dibromomethane	A	0.11	C	15
U070	o-Dichlorobenzene	A	0.088	C	6.2
U071	m-Dichlorobenzene	A	0.036	C	6.2
U072	p-Dichlorobenzene	A	0.090	C	6.2

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

@ Units for the lead standard are mg/l; analyzed by TCLP extract.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U073	3,3'-Dichlorobenzidine	B	BDAT	B	BDAT
U074	cis-1,4-Dichloro-2-butene	B	BDAT	B	BDAT
U074	trans-1,4-Dichloro-2-butene	B	BDAT	B	BDAT
U075	Dichlorodifluoromethane	A	0.23	C	7.2
U076	1,1-Dichloroethane	A	0.059	C	7.2
U077	1,2-Dichloroethane	A	0.21	C	7.2
U078	1,1-Dichloroethylene	A	0.025	C	33
U079	trans-1,2-Dichloroethylene	A	0.054	C	33
U080	Methylene chloride	A	0.089	C	33
U081	2,4-Dichlorophenol	A	0.044	C	14
U082	2,6-Dichlorophenol	A	0.044	C	14
U083	1,2-Dichloropropane	A	0.85	C	18
U084	cis-1,3-Dichloropropylene	A	0.036	C	18
U084	trans-1,3-Dichloropropylene	A	0.036	C	18
U085	1,2:3,4-Diepoxybutane	B	BDAT	B	BDAT-FS
U089	Diethylstilbestrol	B	BDAT	B	BDAT
U090	Dihydrosafrole	B	BDAT	B	BDAT
U091	3,3'-Dimethoxybenzidine	B	BDAT	B	BDAT
U092	Dimethylamine	B	BDAT	B	BDAT
U093	p-Dimethylaminoazobenzene	B	BDAT	B	BDAT
U094	7,12-Dimethyl benz(a)anthracene	B	BDAT	B	BDAT-FS
U095	3,3'-Dimethylbenzidine	B	BDAT	B	BDAT
U097	Dimethylcarbamoyl chloride	B	BDAT	B	BDAT
U101	2,4-Dimethylphenol	A	0.036	C	14
U105	2,4-Dinitrotoluene	A	0.32	C	140
U106	2,6-Dinitrotoluene	A	0.55	C	28
U108	1,4-Dioxane	A	0.12	C	170
U110	Dipropylamine	B	BDAT	B	BDAT
U111	Di-n-propylnitrosamine	A	0.40	C	14
U112	Ethyl acetate	A	0.34	C	33
U113	Ethyl acrylate	B	BDAT	B	BDAT-FS
U114	Ethylene bis-dithiocarbamic acid	B	BDAT	B	BDAT
U115	Ethylene oxide	A	0.12	a	a
U116	Ethylene thiourea	B	BDAT	B	BDAT
U117	Ethyl ether	A	0.12	C	160
U118	Ethyl methacrylate	A	0.14	C	160
U119	Ethyl methanesulfonate	B	BDAT	B	BDAT
U120	Fluoranthene	A	0.068	C	8.2
U121	Trichloromonofluoromethane	A	0.020	C	33
U122	Formaldehyde	B	BDAT	B	BDAT-FS
U123	Formic acid	B	BDAT	B	BDAT-FS
U124	Furan	B	BDAT	B	BDAT-FS
U125	Furfural	B	BDAT	B	BDAT-FS
U126	Glycidylaldehyde	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

a Constituent is regulated in the wastewater form but not in the nonwastewater form.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U127	Hexachlorobenzene	A	0.055	C	37
U128	Hexachlorobutadiene	A	0.055	C	28
U129	alpha-BHC	A	0.00014	C	0.066
U129	beta-BHC	A	0.00014	C	0.066
U129	delta-BHC	A	0.023	C	0.066
U129	gamma-BHC (Lindane)	A	0.0017	C	0.066
U130	Hexachlorocyclopentadiene	A	0.057	C	3.6
U131	Hexachloroethane	A	0.055	C	28
U132	Hexachlorophene	B	BDAT	B	BDAT
U137	Indeno(1,2,3-c,d)pyrene	A	0.0055	C	8.2
U138	Iodomethane	A	0.19	C	65
U140	Isobutyl alcohol	A	5.6	C	170
U141	Isosafrole	A	0.081	C	2.6
U142	Kepone	A	0.0011	C	0.13
U143	Lasiocarpine	B	BDAT	B	BDAT
U147	Maleic anhydride	B	BDAT	B	BDAT-FS
U148	Maleic hydrazide	B	BDAT	B	BDAT
U149	Malononitrile	B	BDAT	B	BDAT
U150	Melphalan	B	BDAT	B	BDAT
U152	Methacrylonitrile	A	0.24	C	84
U153	Methanethiol	B	BDAT	B	BDAT
U154	Methanol	A	5.6	B	BDAT-FS
U155	Methapyrilene	A	0.081	C	1.5
U156	Methyl chlorocarbonate	B	BDAT	B	BDAT
U157	3-Methylcholanthrene	A	0.0055	C	15
U158	4,4'-Methylenebis(2-chloroaniline)	A	0.50	C	35
U159	Methyl ethyl ketone	A	0.28	C	36
U161	Methyl isobutyl ketone	A	0.14	C	33
U162	Methyl methacrylate	A	0.14	C	160
U163	N-Methyl-N-nitro-N-nitrosoguanidine	B	BDAT	B	BDAT
U164	Methylthiouracil	B	BDAT	B	BDAT
U165	Naphthalene	A	0.059	C	3.1
U166	1,4-Naphthoquinone	B	BDAT	B	BDAT
U167	1-Naphthylamine	B	BDAT	B	BDAT
U168	2-Naphthylamine	A	0.52	B	BDAT
U169	Nitrobenzene	A	0.068	C	14
U170	4-Nitrophenol	A	0.12	C	29
U171	2-Nitropropane	B	BDAT	B	BDAT
U172	N-Nitrosodi-n-butylamine	A	0.40	C	17
U173	N-Nitrosodiethanolamine	B	BDAT	B	BDAT
U174	N-Nitrosodiethylamine	A	0.40	C	28
U176	N-Nitroso-N-ethylurea	B	BDAT	B	BDAT
U177	N-Nitroso-N-methylurea	B	BDAT	B	BDAT
U178	N-Nitroso-N-methylurethane	B	BDAT	B	BDAT
U179	N-Nitrosopiperidine	A	0.013	C	35

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U180	N-Nitrosopyrrolidine	A	0.013	C	35
U181	5-Nitro-o-toluidine	A	0.32	C	28
U182	Paraldehyde	B	BDAT	B	BDAT-FS
U183	Pentachlorobenzene	A	0.055	C	37
U184	Pentachloroethane	B	BDAT	B	BDAT
U185	Pentachloronitrobenzene	A	0.055	C	4.8
U186	1,3-Pentadiene	B	BDAT	B	BDAT-FS
U187	Phenacetin	A	0.081	C	16
U188	Phenol	A	0.039	C	6.2
U191	2-Picoline	B	BDAT	B	BDAT
U192	Pronamide	A	0.093	C	1.5
U193	1,3-Propane sultone	B	BDAT	B	BDAT
U194	n-Propylamine	B	BDAT	B	BDAT
U196	Pyridine	A	0.014	C	16
U197	p-Benzoquinone	B	BDAT	B	BDAT-FS
U200	Reserpine	B	BDAT	B	BDAT
U201	Resorcinol	B	BDAT	B	BDAT-FS
U202	Saccharin and salts	B	BDAT	B	BDAT
U203	Safrole	A	0.081	C	22
U206	Streptozotocin	B	BDAT	B	BDAT
U207	1,2,4,5-Tetrachlorobenzene	A	0.055	C	19
U208	1,1,1,2-Tetrachloroethane	A	0.057	C	42
U209	1,1,2,2-Tetrachloroethane	A	0.057	C	42
U210	Tetrachloroethylene	A	0.056	C	5.6
U211	Carbon tetrachloride	A	0.057	C	5.6
U213	Tetrahydrofuran	B	BDAT	B	BDAT-FS
U218	Thioacetamide	B	BDAT	B	BDAT
U219	Thiourea	B	BDAT	B	BDAT
U220	Toluene	A	0.080	C	28
U222	o-Toluidine hydrochloride	B	BDAT	B	BDAT
U225	Tribromomethane (Bromoform)	A	0.63	C	15
U226	1,1,1-Trichloroethane	A	0.054	C	5.6
U227	1,1,2-Trichloroethane	A	0.054	C	5.6
U228	Trichloroethylene	A	0.054	C	5.6
U234	sym-Trinitrobenzene	B	BDAT	B	BDAT
U236	Trypan blue	B	BDAT	B	BDAT
U237	Uracil mustard	B	BDAT	B	BDAT
U238	Ethyl carbamate	B	BDAT	B	BDAT
U239	Xylenes (total)	A	0.32	C	28
U240	2,4-Dichlorophenoxyacetic acid	A	0.72	C	10
U240	2,4-Dichlorophenoxyacetic salts and esters	B	BDAT	B	BDAT
U243	Hexachloropropene	A	0.035	C	28
U244	Thiram	B	BDAT	B	BDAT
U247	Methoxychlor	A	0.25	C	0.18
U248	Warfarin ($\leq$0.3%)	B	BDAT	B	BDAT-FS

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Acetaldehyde	U001	B	BDAT	B	BDAT
Acetone	U002	A	0.28	C	160
Acetonitrile	U003	A	0.17	B	BDAT
Acetophenone	U004	A	0.010	C	9.7
2-Acetylaminofluorene	U005	A	0.059	C	140
Acetyl chloride	U006	B	BDAT	B	BDAT
1-Acetyl-2-thiourea	P002	B	BDAT	B	BDAT
Acrolein	P003	A	0.29	B	BDAT-FS
Acrylamide	U007	B	BDAT	B	BDAT
Acrylic acid	U008	B	BDAT	B	BDAT-FS
Acrylonitrile	U009	A	0.24	C	84
Aldicarb	P070	B	BDAT	B	BDAT
Aldrin	P004	A	0.021	C	0.066
Allyl alcohol	P005	B	BDAT	B	BDAT-FS
5-Aminomethyl-3-isoxazolol	P007	B	BDAT	B	BDAT
4-Aminopyridine	P008	B	BDAT	B	BDAT
Amitrole	U011	B	BDAT	B	BDAT
Aniline	U012	A	0.81	C	14
Auramine	U014	B	BDAT	B	BDAT
Azaserine	U015	B	BDAT	B	BDAT
Aziridine	P054	B	BDAT	B	BDAT
Benzal chloride	U017	B	BDAT	B	BDAT
Benz(a)anthracene	U018	A	0.059	C	8.2
Benz(c)acridine	U016	B	BDAT	B	BDAT-FS
Benzene	U019	A	0.14	C	36
Benzene sulfonyl chloride	U020	B	BDAT	B	BDAT
Benzidine	U021	B	BDAT	B	BDAT
Benzo(a)pyrene	U022	A	0.061	C	8.2
p-Benzoquinone	U197	B	BDAT	B	BDAT-FS
Benzyl chloride	P028	B	BDAT	B	BDAT
alpha-BHC	U129	A	0.00014	C	0.066
beta-BHC	U129	A	0.00014	C	0.066
delta-BHC	U129	A	0.023	C	0.066
gamma-BHC	U129	A	0.0017	C	0.066
Bis(2-chloroethoxy)methane	U024	A	0.036	C	7.2
Bis(2-chloroethyl)ether	U025	A	0.033	C	7.2
Bis(2-chloroisopropyl)ether	U027	A	0.055	C	7.2
Bis(chloromethyl)ether	P016	B	BDAT	B	BDAT
Bromoacetone	P017	B	BDAT	B	BDAT
Bromomethane (Methyl bromide)	U029	A	0.11	C	15
4-Bromophenyl phenyl ether	U030	A	0.055	C	15
Brucine	P018	B	BDAT	B	BDAT
n-Butyl alcohol	U031	A	5.6	C	2.6
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	P020	A	0.066	C	2.5
Carbon disulfide	P022	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Carbon tetrachloride	U211	A	0.057	C	5.6
Carbonyl fluoride	U033	B	BDAT	B	BDAT
Chlorambucil	U035	B	BDAT	B	BDAT
Chlordane (alpha and gamma)	U036	A	0.0033	C	0.13
Chloroacetaldehyde	P023	B	BDAT	B	BDAT
p-Chloroaniline	P024	A	0.46	C	16
Chlorobenzene	U037	A	0.057	C	5.7
Chlorobenzilate	U038	A	0.10	B	BDAT
1-Chloro-2,3-epoxypropane (Epichlorohydrin)	U041	B	BDAT	B	BDAT
2-Chloroethyl vinyl ether	U042	B	BDAT	B	BDAT
Chloroform	U044	A	0.046	C	5.6
p-Chloro-m-cresol	U039	A	0.018	C	14
Chloromethane (Methyl chloride)	U045	A	0.19	C	33
Chloromethyl methyl ether	U046	B	BDAT	B	BDAT
Chlornaphazine	U026	B	BDAT	B	BDAT
2-Chloronaphthalene	U047	A	0.055	C	5.6
4-Chloro-o-toluidine hydrochloride	U049	B	BDAT	B	BDAT
2-Chlorophenol	U048	A	0.044	C	5.7
1-(o-Chlorophenyl)thiourea	P026	B	BDAT	B	BDAT
3-Chloropropionitrile	P027	B	BDAT	B	BDAT
Chrysene	U050	A	0.059	C	8.2
Creosote - Lead	U051	A	0.28	C	0.51 @
Creosote - Naphthalene	U051	A	0.059	C	3.1
Creosote - Pentachlorophenol	U051	A	0.089	C	7.4
Creosote - Phenanthrene	U051	A	0.059	C	3.1
Creosote - Pyrene	U051	A	0.067	C	8.2
Creosote - Toluene	U051	A	0.080	C	28
Creosote - Xylenes (total)	U051	A	0.32	C	28
Cresol (m- and p- isomers)	U052	A	0.77	C	3.2
o-Cresol	U052	A	0.11	C	5.6
Crotonaldehyde	U053	B	BDAT	B	BDAT-FS
Cumene	U055	B	BDAT	B	BDAT-FS
Cyclohexane	U056	B	BDAT	B	BDAT-FS
Cyclohexanone	U057	A	0.36	B	BDAT-FS
2-Cyclohexyl-4,6-dinitrophenol	P034	B	BDAT	B	BDAT
Daunomycin	U059	B	BDAT	B	BDAT
o,p'-DDD	U060	A	0.023	C	0.087
p,p'-DDD	U060	A	0.023	C	0.087
o,p'-DDD	U061	A	0.023	C	0.087
p,p'-DDD	U061	A	0.023	C	0.087
o,p'-DDE	U061	A	0.031	C	0.087
p,p'-DDE	U061	A	0.031	C	0.087
o,p'-DDT	U061	A	0.0039	C	0.087
p,p'-DDT	U061	A	0.0039	C	0.087

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

@ Units for the lead standard are mg/l, analyzed by TCLP extract.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Diallate	U062	B	BDAT	B	BDAT
Dibenz(a,h)anthracene	U063	A	0.055	C	8.2
1,2,7,8-Dibenzopyrene	U064	B	BDAT	B	BDAT-FS
1,2-Dibromo-3-chloropropane	U066	A	0.11	C	15
1,2-Dibromoethane (Ethylene dibromide)	U067	A	0.028	C	15
Dibromomethane	U068	A	0.11	C	15
m-Dichlorobenzene	U071	A	0.036	C	6.2
o-Dichlorobenzene	U070	A	0.088	C	6.2
p-Dichlorobenzene	U072	A	0.090	C	6.2
3,3'-Dichlorobenzidine	U073	B	BDAT	B	BDAT
cis-1,4-Dichloro-2-butene	U074	B	BDAT	B	BDAT
trans-1,4-Dichloro-2-butene	U074	B	BDAT	B	BDAT
Dichlorodifluoromethane	U075	A	0.23	C	7.2
1,1-Dichloroethane	U076	A	0.059	C	7.2
1,2-Dichloroethane	U077	A	0.21	C	7.2
1,1-Dichloroethylene	U078	A	0.025	C	33
trans-1,2-Dichloroethylene	U079	A	0.054	C	33
2,4-Dichlorophenol	U081	A	0.044	C	14
2,6-Dichlorophenol	U082	A	0.044	C	14
2,4-Dichlorophenoxyacetic acid	U240	A	0.72	C	10
2,4-Dichlorophenoxyacetic salts and esters	U240	B	BDAT	B	BDAT
1,2-Dichloropropane	U083	A	0.85	C	18
cis-1,3-Dichloropropylene	U084	A	0.036	C	18
trans-1,3-Dichloropropylene	U084	A	0.036	C	18
Dieldrin	P037	A	0.017	C	0.13
1,2:3,4-Diepoxybutane	U085	B	BDAT	B	BDAT-FS
Diethylstilbestrol	U089	B	BDAT	B	BDAT
Dihydrosafrole	U090	B	BDAT	B	BDAT
3,3'-Dimethoxybenzidine	U091	B	BDAT	B	BDAT
Dimethylamine	U092	B	BDAT	B	BDAT
p-Dimethylaminoazobenzene	U093	B	BDAT	B	BDAT
7,12-Dimethyl benz(a)anthracene	U094	B	BDAT	B	BDAT-FS
3,3'-Dimethylbenzidine	U095	B	BDAT	B	BDAT
Dimethylcarbamoyl chloride	U097	B	BDAT	B	BDAT
alpha,alpha-Dimethylphenethylamine	P046	B	BDAT	B	BDAT
2,4-Dimethylphenol	U101	A	0.036	C	14
4,6-Dinitro-o-cresol	P047	A	0.28	C	160
4,6-Dinitro-o-cresol salts	P047	B	BDAT	B	BDAT
2,4-Dinitrophenol	P048	A	0.12	C	160
2,4-Dinitrotoluene	U105	A	0.32	C	140
2,6-Dinitrotoluene	U106	A	0.55	C	28
Di-n-propylnitrosamine	U111	A	0.40	C	14
1,4-Dioxane	U108	A	0.12	C	170
Dipropylamine	U110	B	BDAT	B	BDAT
2,4-Dithiobiuret	P049	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Endosulfan I	P050	A	0.023	C	0.066
Endosulfan II	P050	A	0.029	C	0.13
Endosulfan sulfate	P050	A	0.029	C	0.13
Endothall	P088	B	BDAT	B	BDAT-FS
Endrin	P051	A	0.0028	C	0.13
Endrin aldehyde	P051	A	0.025	C	0.13
Epinephrine	P042	B	BDAT	B	BDAT
Ethyl acetate	U112	A	0.34	C	33
Ethyl acrylate	U113	B	BDAT	B	BDAT-FS
Ethyl carbamate	U238	B	BDAT	B	BDAT
Ethyl cyanide (Propanenitrile)	P101	A	0.24	C	360
Ethyl ether	U117	A	0.12	C	160
Ethyl methacrylate	U118	A	0.14	C	160
Ethyl methanesulfonate	U119	B	BDAT	B	BDAT
Ethylene bis-dithiocarbamic acid	U114	B	BDAT	B	BDAT
Ethylene oxide	U115	A	0.12	a	a
Ethylene thiourea	U116	B	BDAT	B	BDAT
Fluoranthene	U120	A	0.068	C	8.2
Fluoroacetamide	P057	B	BDAT	B	BDAT
Fluoroacetic acid, sodium salt	P058	B	BDAT	B	BDAT
Formaldehyde	U122	B	BDAT	B	BDAT-FS
Formic acid	U123	B	BDAT	B	BDAT-FS
Furan	U124	B	BDAT	B	BDAT-FS
Furfural	U125	B	BDAT	B	BDAT-FS
Glycidylaldehyde	U126	B	BDAT	B	BDAT-FS
Heptachlor	P059	A	0.0012	C	0.066
Heptachlor epoxide	P059	A	0.016	C	0.066
Hexachlorobenzene	U127	A	0.055	C	37
Hexachlorobutadiene	U128	A	0.055	C	28
Hexachlorocyclopentadiene	U130	A	0.057	C	3.6
Hexachloroethane	U131	A	0.055	C	28
Hexachlorophene	U132	B	BDAT	B	BDAT
Hexachloropropene	U243	A	0.035	C	28
Indeno(1,2,3-c,d)pyrene	U137	A	0.0055	C	8.2
Iodomethane	U138	A	0.19	C	65
Isobutyl alcohol	U140	A	5.6	C	170
Isocyanic acid, methyl ester	P064	B	BDAT	B	BDAT
Isodrin	P060	A	0.021	C	0.066
Isosafrole	U141	A	0.081	C	2.6
Kepone	U142	A	0.0011	C	0.13
Lasiocarpine	U143	B	BDAT	B	BDAT
Maleic anhydride	U147	B	BDAT	B	BDAT-FS
Maleic hydrazide	U148	B	BDAT	B	BDAT
Malononitrile	U149	B	BDAT	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

a Constituent is regulated in the wastewater form, but not in the nonwastewater form.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated U and P Waste Constituents	Waste Code	Wastewater Document	Wastewater Treatment Standard (mg/l) *	Nonwastewater Document	Nonwastewater Treatment Standard (mg/kg) **
Melphalan	U150	B	BDAT	B	BDAT
Methacrylonitrile	U152	A	0.24	C	84
Methanethiol	U153	B	BDAT	B	BDAT
Methanol	U154	A	5.6	B	BDAT-FS
Methapyrilene	U155	A	0.081	C	1.5
Methomyl	P066	B	BDAT	B	BDAT
Methoxychlor	U247	A	0.25	C	0.18
Methyl chlorocarbonate	U156	B	BDAT	B	BDAT
Methyl ethyl ketone	U159	A	0.28	C	36
Methyl isobutyl ketone	U161	A	0.14	C	33
Methyl methacrylate	U162	A	0.14	C	160
2-Methylaziridine	P067	B	BDAT	B	BDAT
3-Methylcholanthrene	U157	A	0.0055	C	15
4,4'-Methylenebis(2-chloroaniline)	U158	A	0.50	C	35
Methylene chloride	U080	A	0.089	C	33
Methyllactonitrile	P069	B	BDAT	B	BDAT
N-Methyl-N-nitro-N-nitrosoguanidine	U163	B	BDAT	B	BDAT
Methylthiouracil	U164	B	BDAT	B	BDAT
Mitomycin C	U010	B	BDAT	B	BDAT
Naphthalene	U165	A	0.059	C	3.1
1,4-Naphthoquinone	U166	B	BDAT	B	BDAT-FS
1-Naphthylamine	U167	B	BDAT	B	BDAT
2-Naphthylamine	U168	A	0.52	B	BDAT
1-Naphthyl-2-thiourea	P072	B	BDAT	B	BDAT
Nicotine and salts	P075	B	BDAT	B	BDAT
p-Nitroaniline	P077	A	0.028	C	28
Nitrobenzene	U169	A	0.068	C	14
5-Nitro-o-toluidine	U181	A	0.32	C	28
4-Nitrophenol	U170	A	0.12	C	29
2-Nitropropane	U171	B	BDAT	B	BDAT
N-Nitrosodiethanolamine	U173	B	BDAT	B	BDAT
N-Nitrosodiethylamine	U174	A	0.40	C	28
N-Nitrosodimethylamine	P082	A	0.40	B	BDAT
N-Nitrosodi-n-butylamine	U172	A	0.40	C	17
N-Nitrosomethylvinylamine	P084	B	BDAT	B	BDAT
N-Nitroso-N-ethylurea	U176	B	BDAT	B	BDAT
N-Nitroso-N-methylurea	U177	B	BDAT	B	BDAT
N-Nitroso-N-methylurethane	U178	B	BDAT	B	BDAT
N-Nitrosopiperidine	U179	A	0.013	C	35
N-Nitrosopyrrolidine	U180	A	0.013	C	35
Paraldehyde	U182	B	BDAT	B	BDAT-FS
Pentachloroethane	U184	B	BDAT	B	BDAT
Pentachlorobenzene	U183	A	0.055	C	37
Pentachloronitrobenzene	U185	A	0.055	C	4.8
1,3-Pentadiene	U186	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Phenacetin	U187	A	0.081	C	16
Phenol	U188	A	0.039	C	6.2
N-Phenylthiourea	P093	B	BDAT	B	BDAT
Phosgene	P095	B	BDAT	B	BDAT
2-Picoline	U191	B	BDAT	B	BDAT
Pronamide	U192	A	0.093	C	1.5
1,3-Propane sultone	U193	B	BDAT	B	BDAT
Propargyl alcohol	P102	B	BDAT	B	BDAT-FS
n-Propylamine	U194	B	BDAT	B	BDAT
Pyridine	U196	A	0.014	C	16
Reserpine	U200	B	BDAT	B	BDAT
Resorcinol	U201	B	BDAT	B	BDAT-FS
Saccharin and salts	U202	B	BDAT	B	BDAT
Safrole	U203	A	0.081	C	22
Streptozotocin	U206	B	BDAT	B	BDAT
Strychnine and salts	P108	B	BDAT	B	BDAT
1,2,4,5-Tetrachlorobenzene	U207	A	0.055	C	19
1,1,1,2-Tetrachloroethane	U208	A	0.057	C	42
1,1,2,2-Tetrachloroethane	U209	A	0.057	C	42
Tetrachloroethylene	U210	A	0.056	C	5.6
Tetrahydrofuran	U213	B	BDAT	B	BDAT-FS
Thioacetamide	U218	B	BDAT	B	BDAT
Thiofanox	P045	B	BDAT	B	BDAT
Thiophenol (Benzenethiol)	P014	B	BDAT	B	BDAT
Thiosemicarbazide	P116	B	BDAT	B	BDAT
Thiourea	U219	B	BDAT	B	BDAT
Thiram	U244	B	BDAT	B	BDAT
Toluene	U220	A	0.080	C	28
o-Toluidine hydrochloride	U222	B	BDAT	B	BDAT
Toxaphene	P123	A	0.0095	C	1.3
Tribromomethane (Bromoform)	U225	A	0.63	C	15
Trichloroacetaldehyde (Chloral)	U034	B	BDAT	B	BDAT
1,1,1-Trichloroethane	U226	A	0.054	C	5.6
1,1,2-Trichloroethane	U227	A	0.054	C	5.6
Trichloroethylene	U228	A	0.054	C	5.6
Trichloromethanethiol	P118	B	BDAT	B	BDAT
Trichloromonofluoromethane	U121	A	0.020	C	33
sym-Trinitrobenzene	U234	B	BDAT	B	BDAT
Trypan blue	U236	B	BDAT	B	BDAT
Uracil mustard	U237	B	BDAT	B	BDAT
Vinyl chloride	U043	A	0.27	C	33
Warfarin (>0.3%)	P001	B	BDAT	B	BDAT-FS
Warfarin (≤0.3%)	U248	B	BDAT	B	BDAT-FS
Xylenes (total)	U239	A	0.32	C	28

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)

INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Acenaphthalene	F039	A	0.059	C	3.4
Acenaphthene	F039	A	0.059	C	4.0
Acetone	F039	A	0.28	C	160
Acetonitrile	F039	A	0.17	C	NR
Acetophenone	F039	A	0.010	C	9.7
2-Acetylaminofluorene	F039	A	0.059	C	140
Acrolein	F039	A	0.29	C	NR
Acrylonitrile	F039	A	0.24	C	84
Aldrin	F039	A	0.021	C	0.066
4-Aminobiphenyl	F039	A	0.13	C	NR
Aniline	F039	A	0.810	C	14
Anthracene	F039	A	0.059	C	4.0
Aramite	F039	A	0.36	C	NR
Aroclor 1016	F039	A	0.013	C	0.92
Aroclor 1221	F039	A	0.014	C	0.92
Aroclor 1232	F039	A	0.013	C	0.92
Aroclor 1242	F039	A	0.017	C	0.92
Aroclor 1248	F039	A	0.013	C	0.92
Aroclor 1254	F039	A	0.014	C	1.8
Aroclor 1260	F039	A	0.014	C	1.8
Benz(a)anthracene	F039	A	0.059	C	8.2
Benzene	F039	A	0.140	C	36
Benzo(b)fluoranthene	F039	A	0.055	C	3.4
Benzo(k)fluoranthene	F039	A	0.059	C	3.4
Benzo(g,h,i)perylene	F039	A	0.0055	C	1.5
Benzo(a)pyrene	F039	A	0.061	C	8.2
alpha-BHC	F039	A	0.00014	C	0.066
beta-BHC	F039	A	0.00014	C	0.066
delta-BHC	F039	A	0.023	C	0.066
gamma-BHC (Lindane)	F039	A	0.0017	C	0.066
Bis(2-chloroethoxy)methane	F039	A	0.036	C	7.2
Bis(2-chloroethyl)ether	F039	A	0.033	C	7.2
Bis(2-chloroisopropyl)ether	F039	A	0.055	C	7.2
Bis(2-ethylhexyl)phthalate	F039	A	0.28	C	28
Bromodichloromethane	F039	A	0.35	C	15
Bromomethane (Methyl bromide)	F039	A	0.11	C	15
4-Bromophenyl phenyl ether	F039	A	0.055	C	15
n-Butyl alcohol	F039	A	5.6	C	2.6
Butyl benzyl phthalate	F039	A	0.017	C	7.9
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	F039	A	0.066	C	2.5
Carbon disulfide	F039	A	0.014	C	NR
Carbon tetrachloride	F039	A	0.057	C	5.6
Chlordane (alpha and gamma)	F039	A	0.0033	C	0.13
p-Chloroaniline	F039	A	0.46	C	16
Chlorobenzene	F039	A	0.057	C	5.7

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Chlorobenzilate	F039	A	0.10	C	NR
2-Chloro-1,3-butadiene	F039	A	0.057	C	NR
Chlorodibromomethane	F039	A	0.057	C	15
Chloroethane	F039	A	0.27	C	6.0
Chloroform	F039	A	0.046	C	5.6
p-Chloro-m-cresol	F039	A	0.018	C	14
Chloromethane (Methyl chloride)	F039	A	0.19	C	33
2-Chloronaphthalene	F039	A	0.055	C	5.6
2-Chlorophenol	F039	A	0.044	C	5.7
3-Chloropropene	F039	A	0.036	C	28
Chrysene	F039	A	0.059	C	8.2
Cresol (m- and p- isomers)	F039	A	0.77	C	3.2
o-Cresol	F039	A	0.11	C	5.6
Cyclohexanone	F039	A	0.36	C	NR
o,p'-DDD	F039	A	0.023	C	0.087
p,p'-DDD	F039	A	0.023	C	0.087
o,p'-DDE	F039	A	0.031	C	0.087
p,p'-DDE	F039	A	0.031	C	0.087
o,p'-DDT	F039	A	0.0039	C	0.087
p,p'-DDT	F039	A	0.0039	C	0.087
Dibenz(a,h)anthracene	F039	A	0.055	C	8.2
Dibenzo(a,e)pyrene	F039	A	0.061	C	NR
1,2-Dibromo-3-chloropropane	F039	A	0.11	C	15
1,2-Dibromoethane (Ethylene dibromide)	F039	A	0.028	C	15
Dibromomethane	F039	A	0.11	C	15
m-Dichlorobenzene	F039	A	0.036	C	6.2
o-Dichlorobenzene	F039	A	0.088	C	6.2
p-Dichlorobenzene	F039	A	0.090	C	6.2
Dichlorodifluoromethane	F039	A	0.23	C	7.2
1,1-Dichloroethane	F039	A	0.059	C	7.2
1,2-Dichloroethane	F039	A	0.21	C	7.2
1,1-Dichloroethylene	F039	A	0.025	C	33
trans-1,2-Dichloroethylene	F039	A	0.054	C	33
2,4-Dichlorophenol	F039	A	0.044	C	14
2,6-Dichlorophenol	F039	A	0.044	C	14
2,4-Dichlorophenoxyacetic acid	F039	A	0.72	C	10
1,2-Dichloropropane	F039	A	0.85	C	18
cis-1,3-Dichloropropene	F039	A	0.036	C	18
trans-1,3-Dichloropropene	F039	A	0.036	C	18
Dieldrin	F039	A	0.017	C	0.13
Diethyl phthalate	F039	A	0.20	C	28
2,4-Dimethylphenol	F039	A	0.036	C	14
Dimethyl phthalate	F039	A	0.047	C	28
Di-n-butyl phthalate	F039	A	0.057	C	28
1,4-Dinitrobenzene	F039	A	0.32	C	2.3

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated Leachate Constituents	Waste Code	Wastewater		Nonwastewater	
		Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
4,6-Dinitro-o-cresol	F039	A	0.28	C	160
2,4-Dinitrophenol	F039	A	0.12	C	160
2,4-Dinitrotoluene	F039	A	0.32	C	140
2,6-Dinitrotoluene	F039	A	0.55	C	28
Di-n-octyl phthalate	F039	A	0.017	C	28
Di-n-propylnitrosamine	F039	A	0.40	C	14
1,4-Dioxane	F039	A	0.12	C	170
Diphenylamine	F039	A	0.52	C	NR
1,2-Diphenylhydrazine	F039	A	0.087	C	NR
Diphenylnitrosamine	F039	A	0.40	C	NR
Disulfoton	F039	A	0.017	C	6.2
Endosulfan I	F039	A	0.023	C	0.066
Endosulfan II	F039	A	0.029	C	0.13
Endosulfan sulfate	F039	A	0.029	C	0.13
Endrin	F039	A	0.0028	C	0.13
Endrin aldehyde	F039	A	0.025	C	0.13
Ethyl acetate	F039	A	0.34	C	33
Ethyl benzene	F039	A	0.057	C	6.0
Ethyl cyanide (Propanenitrile)	F039	A	0.24	C	360
Ethyl ether	F039	A	0.12	C	160
Ethyl methacrylate	F039	A	0.14	C	160
Ethylene oxide	F039	A	0.12	C	NR
Famphur	F039	A	0.017	C	15
Fluoranthene	F039	A	0.068	C	8.2
Fluorene	F039	A	0.059	C	4.0
Heptachlor	F039	A	0.0012	C	0.066
Heptachlor epoxide	F039	A	0.016	C	0.066
Hexachlorobenzene	F039	A	0.055	C	37
Hexachlorobutadiene	F039	A	0.055	C	28
Hexachlorocyclopentadiene	F039	A	0.057	C	3.6
Hexachlorodibenzofurans	F039	A	0.000063	C	0.001
Hexachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
Hexachloroethane	F039	A	0.055	C	28
Hexachloropropene	F039	A	0.035	C	28
Indeno(1,2,3-c,d)pyrene	F039	A	0.0055	C	8.2
Iodomethane	F039	A	0.19	C	65
Isobutyl alcohol	F039	A	5.6	C	170
Isodrin	F039	A	0.021	C	0.066
Isosafrole	F039	A	0.081	C	2.6
Kepone	F039	A	0.0011	C	0.13
Methacrylonitrile	F039	A	0.24	C	84
Methanol	F039	A	5.6	C	NR
Methapyrilene	F039	A	0.081	C	1.5
Methoxychlor	F039	A	0.25	C	0.18
Methyl ethyl ketone	F039	A	0.28	C	36

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Methyl isobutyl ketone	F039	A	0.14	C	33
Methyl methacrylate	F039	A	0.14	C	160
Methyl methanesulfonate	F039	A	0.018	C	NR
Methyl parathion	F039	A	0.014	C	4.6
3-Methylcholanthrene	F039	A	0.0055	C	15
4,4'-Methylenebis(2-chloroaniline)	F039	A	0.50	C	35
Methylene chloride	F039	A	0.089	C	33
Naphthalene	F039	A	0.059	C	3.1
2-Naphthylamine	F039	A	0.52	C	NR
p-Nitroaniline	F039	A	0.028	C	28
Nitrobenzene	F039	A	0.068	C	14
5-Nitro-o-toluidine	F039	A	0.32	C	28
4-Nitrophenol	F039	A	0.12	C	29
N-Nitrosodiethylamine	F039	A	0.40	C	28
N-Nitrosodimethylamine	F039	A	0.40	C	NR
N-Nitrosodi-n-butylamine	F039	A	0.40	C	17
N-Nitrosomethylethylamine	F039	A	0.40	C	2.3
N-Nitrosomorpholine	F039	A	0.40	C	2.3
N-Nitrosopiperidine	F039	A	0.013	C	35
N-Nitrosopyrrolidine	F039	A	0.013	C	35
Parathion	F039	A	0.014	C	4.6
Pentachlorobenzene	F039	A	0.055	C	37
Pentachlorodibenzofurans	F039	A	0.000063	C	0.001
Pentachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
Pentachloronitrobenzene	F039	A	0.055	C	4.8
Pentachlorophenol	F039	A	0.089	C	7.4
Phenacetin	F039	A	0.081	C	16
Phenanthrene	F039	A	0.059	C	3.1
Phenol	F039	A	0.039	C	6.2
Phorate	F039	A	0.021	C	4.6
Phthalic anhydride	F039	A	0.069	C	NR
Pronamide	F039	A	0.093	C	1.5
Pyrene	F039	A	0.067	C	8.2
Pyridine	F039	A	0.014	C	16
Safrole	F039	A	0.081	C	22
Silvex (2,4,5-TP)	F039	A	0.72	C	7.9
1,2,4,5-Tetrachlorobenzene	F039	A	0.055	C	19
Tetrachlorodibenzofurans	F039	A	0.000063	C	0.001
Tetrachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
1,1,1,2-Tetrachloroethane	F039	A	0.057	C	42
1,1,2,2-Tetrachloroethane	F039	A	0.057	C	42
Tetrachloroethylene	F039	A	0.056	C	5.6
2,3,4,6-Tetrachlorophenol	F039	A	0.030	C	37
Toluene	F039	A	0.080	C	28
Toxaphene	F039	A	0.0095	C	1.3

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)

INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Tribromomethane (Bromoform)	F039	A	0.63	C	15
1,2,4-Trichlorobenzene	F039	A	0.055	C	19
1,1,1-Trichloroethane	F039	A	0.054	C	5.6
1,1,2-Trichloroethane	F039	A	0.054	C	5.6
Trichloroethylene	F039	A	0.054	C	5.6
Trichloromonofluoromethane	F039	A	0.020	C	33
2,4,5-Trichlorophenol	F039	A	0.18	C	37
2,4,6-Trichlorophenol	F039	A	0.035	C	37
2,4,5-Trichlorophenoxyacetic acid	F039	A	0.72	C	7.9
1,2,3-Trichloropropane	F039	A	0.85	C	28
1,1,2-Trichloro-1,2,2-trifluoroethane	F039	A	0.057	C	28
Tris(2,3-dibromopropyl)phosphate	F039	A	0.11	C	NR
Vinyl chloride	F039	A	0.27	C	33
Xylenes	F039	A	0.32	C	28
Cyanides (total)	F039	A	1.2	C	1.8
Fluoride	F039	A	35	C	NR
Sulfide	F039	A	14	C	NR
					TCLP (mg/l)
Antimony	F039	A	1.9	C	0.23
Arsenic	F039	A	1.4	C	5.0 [a]
Barium	F039	A	1.2	C	52
Beryllium	F039	A	0.82	C	NR
Cadmium	F039	A	0.20	C	0.066
Chromium (total)	F039	A	0.37	C	5.2
Copper	F039	A	1.3	C	NR
Lead	F039	A	0.28	C	0.51
Mercury	F039	A	0.15	C	0.025
Nickel	F039	A	0.55	C	0.32
Selenium	F039	A	0.82	C	5.7
Silver	F039	A	0.29	C	0.072
Thallium	F039	A	1.4	C	NR
Vanadium	F039	A	0.042	C	NR
Zinc	F039	A	1.0	C	NR

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

[a] Based on EP Toxicity.

Table 1-3

U & P WASTES WITH METHODS OF TREATMENT AS TREATMENT STANDARDS

Regulated Constituent	Waste Code	Wastewater Document	Wastewater Standard (mg/l) *	Nonwastewater Document	Nonwastewater Standard (mg/kg) **
Warfarin (>0.3%)	P001	B	BDAT	B	BDAT-FS
1-Acetyl-2-thiourea	P002	B	BDAT	B	BDAT
Acrolein	P003	A	0.29	B	BDAT-FS
Allyl alcohol	P005	B	BDAT	B	BDAT-FS
5-Aminomethyl-3-isoxazolol	P007	B	BDAT	B	BDAT
4-Aminopyridine	P008	B	BDAT	B	BDAT
Thiophenol (Benzenethiol)	P014	B	BDAT	B	BDAT
Bis(chloromethyl)ether	P016	B	BDAT	B	BDAT
Bromoacetone	P017	B	BDAT	B	BDAT
Brucine	P018	B	BDAT	B	BDAT
Carbon disulfide	P022	A	0.014	B	BDAT
Chloroacetaldehyde	P023	B	BDAT	B	BDAT
1-(o-Chlorophenyl)thiourea	P026	B	BDAT	B	BDAT
3-Chloropropionitrile	P027	B	BDAT	B	BDAT
Benzyl chloride	P028	B	BDAT	B	BDAT
2-Cyclohexyl-4,6-dinitrophenol	P034	B	BDAT	B	BDAT
Epinephrine	P042	B	BDAT	B	BDAT
Thiofanox	P045	B	BDAT	B	BDAT
alpha,alpha-Dimethylphenethylamine	P046	B	BDAT	B	BDAT
4,6-Dinitro-o-cresol salts	P047	B	BDAT	B	BDAT
2,4-Dithiobiuret	P049	B	BDAT	B	BDAT
Aziridine	P054	B	BDAT	B	BDAT
Fluoroacetamide	P057	B	BDAT	B	BDAT
Fluoroacetic acid, sodium salt	P058	B	BDAT	B	BDAT
Isocyanic acid, methyl ester	P064	B	BDAT	B	BDAT
Methomyl	P066	B	BDAT	B	BDAT
2-Methylaziridine	P067	B	BDAT	B	BDAT
Methyllactonitrile	P069	B	BDAT	B	BDAT
Aldicarb	P070	B	BDAT	B	BDAT
1-Naphthyl-2-thiourea	P072	B	BDAT	B	BDAT
Nicotine and salts	P075	B	BDAT	B	BDAT
N-Nitrosodimethylamine	P082	A	0.40	B	BDAT
N-Nitrosomethylvinylamine	P084	B	BDAT	B	BDAT
Endothall	P088	B	BDAT	B	BDAT-FS
N-Phenylthiourea	P093	B	BDAT	B	BDAT
Phosgene	P095	B	BDAT	B	BDAT
Propargyl alcohol	P102	B	BDAT	B	BDAT-FS
Strychnine and salts	P108	B	BDAT	B	BDAT
Thiosemicarbazide	P116	B	BDAT	B	BDAT
Trichloromethanethiol	P118	B	BDAT	B	BDAT
Acetaldehyde	U001	B	BDAT	B	BDAT
Acetonitrile	U003	A	0.17	B	BDAT
Acetyl chloride	U006	B	BDAT	B	BDAT
Acrylamide	U007	A	1.0	B	BDAT
Acrylic acid	U008	B	BDAT	B	BDAT-FS
Mitomycin C	U010	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the wastes codes marked as BDAT-FS.

Table 1-3 (Continued)

U & P WASTES WITH METHODS OF TREATMENT AS TREATMENT STANDARDS

Regulated Constituent	Waste Code	Wastewater		Nonwastewater	
		Document	Standard (mg/l) *	Document	Standard (mg/kg) **
Amitrole	U011	B	BDAT	B	BDAT
Auramine	U014	B	BDAT	B	BDAT
Azaserine	U015	B	BDAT	B	BDAT
Benz(c)acridine	U016	B	BDAT	B	BDAT-FS
Benzal chloride	U017	A	0.055	B	BDAT
Benzene sulfonyl chloride	U020	B	BDAT	B	BDAT
Benzidine	U021	B	BDAT	B	BDAT
Chlornaphazine	U026	B	BDAT	B	BDAT
Carbonyl fluoride	U033	B	BDAT	B	BDAT
Trichloroacetaldehyde (Chloral)	U034	B	BDAT	B	BDAT
Chlorambucil	U035	B	BDAT	B	BDAT
Chlorobenzilate	U038	A	0.10	B	BDAT
1-Chloro-2,3-epoxypropane (Epichlorohydrin)	U041	B	BDAT	B	BDAT
2-Chloroethyl vinyl ether	U042	A	0.057	B	BDAT
Chloromethyl methyl ether	U046	B	BDAT	B	BDAT
4-Chloro-o-toluidine hydrochloride	U049	B	BDAT	B	BDAT
Crotonaldehyde	U053	B	BDAT	B	BDAT-FS
Cumene	U055	B	BDAT	B	BDAT-FS
Cyclohexane	U056	B	BDAT	B	BDAT-FS
Cyclohexanone	U057	A	0.36	B	BDAT-FS
Daunomycin	U059	B	BDAT	B	BDAT
Diallate	U062	B	BDAT	B	BDAT
1,2,7,8-Dibenzopyrene	U064	B	BDAT	B	BDAT-FS
3,3′-Dichlorobenzidine	U073	A	0.13	B	BDAT
cis-1,4-Dichloro-2-butene	U074	A	0.036	B	BDAT
trans-1,4-Dichloro-2-butene	U074	A	0.036	B	BDAT
1,2:3,4-Diepoxybutane	U085	B	BDAT	B	BDAT-FS
Diethylstilbestrol	U089	B	BDAT	B	BDAT
Dihydrosafrole	U090	B	BDAT	B	BDAT
3,3′-Dimethoxybenzidine	U091	A	0.13	B	BDAT
Dimethylamine	U092	B	BDAT	B	BDAT
p-Dimethylaminoazobenzene	U093	A	0.13	B	BDAT
7,12-Dimethyl benz(a)anthracene	U094	B	BDAT	B	BDAT-FS
3,3′-Dimethylbenzidine	U095	B	BDAT	B	BDAT
Dimethylcarbamoyl chloride	U097	B	BDAT	B	BDAT
Dipropylamine	U110	B	BDAT	B	BDAT
Ethyl acrylate	U113	B	BDAT	B	BDAT-FS
Ethylene bis-dithiocarbamic acid	U114	B	BDAT	B	BDAT
Ethylene thiourea	U116	B	BDAT	B	BDAT
Ethyl methanesulfonate	U119	B	BDAT	B	BDAT
Formaldehyde	U122	B	BDAT	B	BDAT-FS
Formic acid	U123	B	BDAT	B	BDAT-FS
Furan	U124	B	BDAT	B	BDAT-FS
Furfural	U125	B	BDAT	B	BDAT-FS
Glycidylaldehyde	U126	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-3 (Continued)

U & P WASTES WITH METHODS OF TREATMENT AS TREATMENT STANDARDS

		Wastewater		Nonwastewater	
Regulated Constituent	Waste Code	Document	Standard (mg/l) *	Document	Standard (mg/kg) **
Hexachlorophene	U132	B	BDAT	B	BDAT
Lasiocarpine	U143	B	BDAT	B	BDAT
Maleic anhydride	U147	B	BDAT	B	BDAT-FS
Maleic hydrazide	U148	B	BDAT	B	BDAT
Malononitrile	U149	B	BDAT	B	BDAT
Melphalan	U150	B	BDAT	B	BDAT
Methanethiol	U153	B	BDAT	B	BDAT
Methanol	U154	A	5.6	B	BDAT-FS
Methyl chlorocarbonate	U156	B	BDAT	B	BDAT
N-Methyl-N-nitro-N-nitrosoguanidine	U163	B	BDAT	B	BDAT
Methylthiouracil	U164	B	BDAT	B	BDAT
1,4-Naphthoquinone	U166	B	BDAT	B	BDAT
1-Naphthylamine	U167	B	BDAT	B	BDAT
2-Naphthylamine	U168	A	0.52	B	BDAT
2-Nitropropane	U171	B	BDAT	B	BDAT
N-Nitrosodiethanolamine	U173	B	BDAT	B	BDAT
N-Nitroso-N-ethylurea	U176	B	BDAT	B	BDAT
N-Nitroso-N-methylurea	U177	B	BDAT	B	BDAT
N-Nitroso-N-methylurethane	U178	B	BDAT	B	BDAT
Paraldehyde	U182	B	BDAT	B	BDAT-FS
Pentachloroethane	U184	B	BDAT	B	BDAT
1,3-Pentadiene	U186	B	BDAT	B	BDAT-FS
2-Picoline	U191	B	BDAT	B	BDAT
1,3-Propane sultone	U193	B	BDAT	B	BDAT
n-Propylamine	U194	B	BDAT	B	BDAT
p-Benzoquinone	U197	B	BDAT	B	BDAT-FS
Reserpine	U200	B	BDAT	B	BDAT
Resorcinol	U201	B	BDAT	B	BDAT-FS
Saccharin and salts	U202	B	BDAT	B	BDAT
Streptozotocin	U206	B	BDAT	B	BDAT
Tetrahydrofuran	U213	B	BDAT	B	BDAT-FS
Thioacetamide	U218	B	BDAT	B	BDAT
Thiourea	U219	B	BDAT	B	BDAT
o-Toluidine hydrochloride	U222	B	BDAT	B	BDAT
sym-Trinitrobenzene	U234	B	BDAT	B	BDAT
Trypan blue	U236	B	BDAT	B	BDAT
Uracil mustard	U237	B	BDAT	B	BDAT
Ethyl carbamate	U238	B	BDAT	B	BDAT
2,4-Dichlorophenoxyacetic salts and esters	U240	B	BDAT	B	BDAT
Thiram	U244	B	BDAT	B	BDAT
Warfarin (≤0.3%)	U248	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

2.0 INDUSTRY AFFECTED AND WASTE CHARACTERIZATION

This section provides a description of the industries affected by the land disposal restrictions for the wastes listed in Table 1-3, the processes generating the wastes, the available waste characterization data, and the determination of the waste treatability groups.

2.1 Industry Affected

A U or P waste consists of a commercial chemical product or manufacturing intermediate from a non-specific source containing any of the chemicals listed in 40 CFR 261.33(e) or (f) and in which the listed chemical is the sole active ingredient. Commercial chemical products or manufacturing intermediates include all commercially pure grades of the listed chemical, all technical grades, and all formulated products in which the listed chemical is the sole active ingredient. In addition, an off-specification product that, if it met specification, would have the generic name included in either 261.33(e) or (f) is a U or P waste. Any residue that is a listed chemical remaining in a container or in an inner liner removed from a container that will not be recycled, reclaimed, or reused; or any residue or contaminated soil, water, or debris from a spill of such a chemical is also a U or P waste. However, these wastes do not include manufacturing process wastes. A waste occurs when a product is:

- Discarded or intended to be discarded;
- Mixed with another material and applied to the land for dust suppression or road treatment;
- Applied to land in lieu of its original intended use; or
- Distributed or burned as a fuel or fuel additive.

U wastes are identified as toxic; P wastes are identified as acutely hazardous. Whether a waste is acutely hazardous or toxic generally has no bearing on its treatability.

Industries that generate the wastes listed in Table 1-3 include the organic chemical, pharmaceutical, dye and pigment, textile and fiber, pesticide, and rubber industries. The Agency estimates that approximately 600 facilities generate these wastes. The four-digit Standard Industrial Classification (SIC) Codes associated with the organic chemicals industry is 2869 (Industrial Organic Chemicals, Not Elsewhere Classified). Table A-1 in Appendix A identifies the industrial uses of these commercial chemical products. Table A-2 provides a summary of the number of facilities that may generate each waste. The facilities that may generate the U and P waste codes are listed by state and by EPA region in Table A-3.

2.2 Waste Characterization

Waste characterization data are not currently available for any of the waste codes included in this document. Due to the diversity of methods of waste generation, the compositions of these wastes vary greatly. The constituents of concern may be present at concentrations varying from several parts per million in a waste to nearly 100% in a waste generated from virtually pure product.

2.3 Determination of Waste Treatability Groups

In the course of developing treatment standards, EPA combined the wastes included in this document, as well as all other Third Third U and P wastes, into treatability groups based on similarities in composition, structure, and functional groups present within the structure of the chemical. The industries that generate these wastes were also considered in establishing these groups.

The U and P wastes have been combined into the following treatability groups:

- Aromatic Wastes;
- Brominated Organic Wastes;
- Halogenated Aliphatic Wastes;
- Halogenated Pesticide and Chlorobenzene Wastes;

- _ Oxygenated Hydrocarbon and Heterocyclic Wastes;
- Wastes of a Pharmaceutical Nature;
- Phenolic Wastes;
- Polynuclear Aromatic Wastes;
- Organo-Nitrogen Compound Wastes;
- Organo-Sulfur Compound Wastes; and
- Miscellaneous Halogenated Organic Wastes.

The specific waste codes included within each treatability group in this document are listed in Table 2-1 (at the end of this section), and the treatability groups are discussed in more detail in the following subsections. The U and P waste treatability groups contain both analyzable and nonanalyzable constituents; only the constituents which have methods of treatment as BDAT treatment standards are discussed below. The chemical structures for all of the U and P waste constituents are presented in Appendix B.

2.3.1 Aromatic and Other Hydrocarbon Wastes

Waste codes in the aromatic and other hydrocarbon wastes treatability group have an aromatic ring as a common functional group. Cyclohexane, which can be reformed into aromatic hydrocarbons, and 1,3-pentadiene, which has aromatic characteristics due to its conjugated double bonds, are also included in this group. Some of the compounds in this group have aliphatic side chains as substituents of the ring. The following waste codes are included in this group:

- U055 - Cumene
- U056 - Cyclohexane
- U186 - 1,3-Pentadiene

2.3.2 Brominated Organic Wastes

The brominated organic wastes treatability group consists of P017, bromoacetone, which is a brominated and oxygenated hydrocarbon. The Agency believes that the presence of bromine in the chemical structure requires modified design and operation of an incineration system. Accordingly, P017 has been placed in a separate brominated organics treatability group.

2.3.3 Halogenated Aliphatic Wastes

Waste codes included in the halogenated aliphatic wastes treatability group have common functional groups of single and double carbon-carbon bonds, with chlorine atoms substituting for hydrogen atoms in at least one bond of the compound. The following waste codes are included in this group:

- U074 - cis-1,4-Dichloro-2-butene
- U074 - trans-1,4-Dichloro-2-butene
- U184 - Pentachloroethane

2.3.4 Halogenated Pesticide and Chlorobenzene Wastes

Waste codes included in the halogenated pesticide and chlorobenzene wastes treatability group are wastes associated with the pesticides industry or wastes that are similar to pesticide wastes. The compounds in this treatability group include chlorinated norbornanes and norbornene derivatives, chlorophenoxy carboxylic acids, and chlorinated diphenyls. Chlorinated norbornanes and norbornene derivatives have common functional groups of single and double carbon-carbon bonds and have methyl chlorine substituents attached to their rings. The functional groups common to chlorophenoxy carboxylic acids include an aromatic ring, a carbon-oxygen-carbon single bond system, a carbon-oxygen double bond, and a carbon-oxygen-hydrogen single bond system, as well as at least two chlorines attached to the aromatic ring. Chlorinated diphenyls consist of two aromatic rings singly bonded to a common carbon atom, with at least one chlorine atom included in their structure. Members of each of these subgroups are used as pesticides. The following waste codes are included in this group:

- U038 - Chlorobenzilate
- U132 - Hexachlorophene
- U240 - 2,4-Dichlorophenoxyacetic salts and esters

2.3.5 Oxygenated Hydrocarbon and Heterocyclic Wastes

Waste codes included in the oxygenated hydrocarbon and heterocyclic waste treatability group include oxygenated compounds that were not included in other waste treatability groups. These compounds contain at least one oxygen atom integrated into the chemical structure by a single or double bond to a carbon atom. This group includes functional groups such as ketones, aldehydes, and alcohols. The following waste codes are included in this group:

- P001 - Warfarin (>0.3%)
- P003 - Acrolein
- P005 - Allyl alcohol
- P088 - Endothall
- P102 - Propargyl alcohol
- U001 - Acetaldehyde
- U008 - Acrylic acid
- U053 - Crotonaldehyde
- U057 - Cyclohexanone
- U085 - 1,2:3,4-Diepoxybutane
- U113 - Ethyl acrylate
- U122 - Formaldehyde
- U123 - Formic acid
- U124 - Furan
- U125 - Furfural
- U126 - Glycidylaldehyde
- U147 - Maleic anhydride
- U154 - Methanol
- U166 - 1,4-Naphthoquinone
- U182 - Paraldehyde
- U197 - p-Benzoquinone
- U213 - Tetrahydrofuran
- U248 - Warfarin ($\leq$0.3%)

2.3.6 Wastes of a Pharmaceutical Nature

Waste codes included in the wastes of a pharmaceutical nature treatability group are wastes associated with the pharmaceutical industry or wastes that are similar to pharmaceutical wastes. All of the waste constituents included in this group are large, complex, heavily-substituted molecules. Almost all of the waste constituents have aromatic rings incorporating nitrogen- or sulfur-heterocyclic units or polynuclear aromatic structures. All of the waste constituents have multiple double bonds and include oxygen, nitrogen, or sulfur atoms. The following waste codes are included in this group:

- P007 - 5-Aminomethyl-3-isoxazolol
- P042 - Epinephrine
- P075 - Nicotine and salts
- P108 - Strychnine and salts
- U010 - Mitomycin C
- U015 - Azaserine
- U035 - Chlorambucil
- U059 - Daunomycin
- U089 - Diethylstilbestrol
- U090 - Dihydrosafrole
- U143 - Lasiocarpine
- U150 - Melphalan
- U163 - N-Methyl-N-nitro-N-nitrosoguanidine
- U164 - Methylthiouracil
- U200 - Reserpine
- U202 - Saccharin and salts
- U206 - Streptozotocin
- U237 - Uracil mustard

2.3.7 Phenolic Wastes

Waste codes included in the phenolic wastes treatability group represent compounds that are classified as phenols and nitrophenols. The nitrophenols also have a nitro group (NO_2) attached directly to the ring. The following waste codes are included in this group:

- P034 - 2-Cyclohexyl-4,6-dinitrophenol
- P047 - 4,6-Dinitro-o-cresol salts
- U201 - Resorcinol

2.3.8 Polynuclear Aromatic Wastes

The waste codes included in the polynuclear aromatic wastes group represent compounds that are classified as polynuclear aromatics. These compounds contain at least two fused or bridged aromatic rings and have an aromatic ring as the common functional group. The compounds in this group also have several substituents attached to their rings, including amides. In some cases, one of the aromatic carbons may be substituted with another element. The following waste codes are included in this group:

- U016 - 3,4-Benzacridine
- U064 - 1,2,7,8-Dibenzopyrene
- U094 - 7,12-Dimethyl benz(a)anthracene

2.3.9 Organo-Nitrogen Compound Wastes

EPA grouped the nonhalogenated wastes containing nitrogen functional groups that were not included in other waste treatability groups addressed in the Third Third, into the organo-nitrogen compound wastes treatability group. The compounds in the organo-nitrogen compound wastes treatability group include nitrogen heterocyclics, amines and amides, aminated diphenyls and biphenyls, nitriles, nitro compounds, and nitroso compounds. The following waste codes are included in this group:

- P008 - 4-Aminopyridine
- P018 - Brucine
- P046 - alpha,alpha-Dimethylphenethylamine
- P054 - Aziridine
- P064 - Isocyanic acid, methyl ester
- P067 - 2-Methylaziridine
- P069 - Methyllactonitrile
- P082 - N-Nitrosodimethylamine
- P084 - N-Nitrosomethylvinylamine
- U003 - Acetonitrile
- U007 - Acrylamide
- U011 - Amitrole
- U014 - Auramine
- U021 - Benzidine
- U091 - 3,3'-Dimethoxybenzidine
- U092 - Dimethylamine
- U093 - p-Dimethylaminoazobenzene
- U095 - 3,3'-Dimethylbenzidine
- U110 - Dipropylamine
- U148 - Maleic hydrazide
- U149 - Malononitrile
- U167 - 1-Naphthylamine
- U168 - 2-Naphthylamine
- U171 - 2-Nitropropane
- U173 - N-Nitrosodiethanolamine
- U176 - N-Nitroso-N-ethylurea
- U177 - N-Nitroso-N-methylurea
- U178 - N-Nitroso-N-methylurethane
- U191 - 2-Picoline
- U194 - n-Propylamine
- U234 - sym-Trinitrobenzene
- U236 - Trypan blue
- U238 - Ethyl carbamate

2.3.10 Organo-Sulfur Compound Wastes

Waste codes included in the organo-sulfur compound wastes treatability group include organo-sulfur compounds that were not included in other waste treatability groups. The compounds in this group include aliphatic and aromatic species; all of which have sulfur-carbon bonds as part of their structure. The following waste codes are included in this group:

- P002 - 1-Acetyl-2-thiourea
- P014 - Thiophenol (Benzenethiol)
- P022 - Carbon disulfide
- P045 - Thiofanox
- P049 - 2,4-Dithiobiuret
- P066 - Methomyl
- P070 - Aldicarb
- P072 - 1-Naphthyl-2-thiourea
- P093 - N-Phenylthiourea
- P116 - Thiosemicarbazide
- U114 - Ethylene bis-dithiocarbamic acid
- U116 - Ethylene thiourea
- U119 - Ethyl methanesulfonate
- U153 - Methanethiol
- U193 - 1,3-Propane sultone
- U218 - Thioacetamide
- U219 - Thiourea
- U244 - Thiram

2.3.11 Miscellaneous Halogenated Organic Wastes

EPA grouped halogenated organic wastes (except brominated organic wastes) that were not included in other waste treatability groups addressed in the Third Third group of wastes into the miscellaneous halogenated organic wastes treatability group. The compounds in this treatability group include several of each of the following categories: chlorinated diphenyls; chlorinated polynuclear aromatics; chlorinated amines, amides, and nitriles; chlorinated methylbenzenes; halogenated aliphatics; halogenated aldehydes, ethers, and esters; and halogenated organosulfur compounds. The following waste codes are included in this group:

- P016 - Bis(chloromethyl)ether
- P023 - Chloroacetaldehyde
- P026 - 1-(o-Chlorophenyl)thiourea

- P027 - 3-Chloropropionitrile
- P028 - Benzyl chloride
- P057 - Fluoroacetamide
- P058 - Fluoroacetic acid, sodium salt
- P095 - Phosgene
- P118 - Trichloromethanethiol
- U006 - Acetyl chloride
- U017 - Benzal chloride
- U020 - Benzene sulfonyl chloride
- U026 - Chlor naphazine
- U033 - Carbonyl fluoride
- U034 - Trichloroacetaldehyde
- U041 - 1-Chloro-2,3-epoxypropane
- U042 - 2-Chloroethyl vinyl ether
- U046 - Chloromethyl methyl ether
- U049 - 4-Chloro-o-toluidine hydrochloride
- U062 - Diallate
- U073 - 3,3'-Dichlorobenzidine
- U097 - Dimethyl carbamoyl chloride
- U156 - Methyl chlorocarbonate
- U222 - o-Toluidine hydrochloride

Table 2-1

WASTE TREATABILITY GROUPS FOR NONANALYZABLE U AND P WASTES

AROMATIC AND OTHER HYDROCARBON WASTES

U055	Cumene
U056	Cyclohexane
U186	1,3-Pentadiene

BROMINATED ORGANIC WASTES

P017	Bromoacetone

HALOGENATED ALIPHATIC WASTES

U074	cis-1,4-Dichloro-2-butene
U074	trans-1,4-Dichloro-2-butene
U184	Pentachlorethane

HALOGENATED PESTICIDE AND CHLOROBENZENE WASTES

U038	Chlorobenzilate
U132	Hexachlorophene
U240	2,4-Dichlorophenoxyacetic salts and esters

OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES

P001	Warfarin (>0.3%)
P003	Acrolein
P005	Allyl alcohol
P088	Endothall
P102	Propargyl alcohol
U001	Acetaldehyde
U008	Acrylic acid
U053	Crotonaldehyde
U057	Cyclohexanone
U085	1,2:3,4-Diepoxybutane
U113	Ethyl acrylate
U122	Formaldehyde
U123	Formic acid
U124	Furan
U125	Furfural
U126	Glycidylaldehyde
U147	Maleic anhydride
U154	Methanol
U166	1,4-Naphthoquinone
U182	Paraldehyde
U197	p-Benzoquinone
U213	Tetrahydrofuran
U248	Warfarin ($\leq$0.3%)

Table 2-1 (Continued)

WASTE TREATABILITY GROUPS FOR NONANALYZABLE U AND P WASTES

WASTES OF A PHARMACEUTICAL NATURE

P007	5-Aminomethyl-3-isoxazolol
P042	Epinephrine
P075	Nicotine and salts
P108	Strychnine and salts
U010	Mitomycin C
U015	Azaserine
U035	Chlorambucil
U059	Daunomycin
U089	Diethylstilbestrol
U090	Dihydrosafrole
U143	Lasiocarpine
U150	Melphalan
U163	N-Methyl-N-nitro-N-nitrosoguanidine
U164	Methylthiouracil
U200	Reserpine
U202	Saccharin and salts
U206	Streptozotocin
U237	Uracil mustard

PHENOLIC WASTES

P034	2-Cyclohexyl-4,6-dinitrophenol
P047	4,6-Dinitro-o-cresol salts
U201	Resorcinol

POLYNUCLEAR AROMATIC WASTES

U016	Benz(c)acridine
U064	1,2,7,8-Dibenzopyrene
U094	7,12-Dimethyl benz(a)anthracene

ORGANO-NITROGEN COMPOUND WASTES

P008	4-Aminopyridine
P018	Brucine
P046	alpha,alpha-Dimethylphenethylamine
P054	Aziridine
P064	Isocyanic acid, methyl ester
P067	2-Methylaziridine
P069	Methyllactonitrile
P082	N-Nitrosodimethylamine
P084	N-Nitrosomethylvinylamine
U003	Acetonitrile
U007	Acrylamide
U011	Amitrole
U014	Auramine
U021	Benzidine

Table 2-1 (Continued)

WASTE TREATABILITY GROUPS FOR NONANALYZABLE U AND P WASTES

ORGANO-NITROGEN COMPOUND WASTES (Continued)

U091	3,3'-Dimethoxybenzidine
U092	Dimethylamine
U093	p-Dimethylaminoazobenzene
U095	3,3'-Dimethylbenzidine
U110	Dipropylamine
U148	Maleic hydrazide
U149	Malononitrile
U167	1-Naphthylamine
U168	2-Naphthylamine
U171	2-Nitropropane
U173	N-Nitrosodiethanolamine
U176	N-Nitroso-N-ethylurea
U177	N-Nitroso-N-methylurea
U178	N-Nitroso-N-methylurethane
U191	2-Picoline
U194	n-Propylamine
U234	sym-Trinitrobenzene
U236	Trypan blue
U238	Ethyl carbamate

ORGANO-SULFUR COMPOUND WASTES

P002	1-Acetyl-2-thiourea
P014	Thiophenol (Benzenethiol)
P022	Carbon disulfide
P045	Thiofanox
P049	2,4-Dithiobiuret
P066	Methomyl
P070	Aldicarb
P072	1-Naphthyl-2-thiourea
P093	N-Phenylthiourea
P116	Thiosemicarbazide
U114	Ethylene bis-dithiocarbamic acid
U116	Ethylene thiourea
U119	Ethyl methanesulfonate
U153	Methanethiol
U193	1,3-Propane sultone
U218	Thioacetamide
U219	Thiourea
U244	Thiram

Table 2-1 (Continued)

WASTE TREATABILITY GROUPS FOR NONANALYZABLE U AND P WASTES

MISCELLANEOUS HALOGENATED ORGANIC WASTES

P016	Bis(chloromethyl)ether
P023	Chloroacetaldehyde
P026	1-(o-Chlorophenyl)thiourea
P027	3-Chloropropionitrile
P028	Benzyl chloride
P057	Fluoroacetamide
P058	Fluoroacetic acid, sodium salt
P095	Phosgene
P118	Trichloromethanethiol
U006	Acetyl chloride
U017	Benzal chloride
U020	Benzene sulfonyl chloride
U026	Chlornaphazine
U033	Carbonyl fluoride
U034	Trichloroacetaldehyde
U041	1-Chloro-2,3-epoxypropane
U042	2-Chloroethyl vinyl ether
U046	Chloromethyl methyl ether
U049	4-Chloro-o-toluidine hydrochloride
U062	Diallate
U073	3,3'-Dichlorobenzidine
U097	Dimethylcarbamoyl chloride
U156	Methyl chlorocarbonate
U222	o-Toluidine hydrochloride

3.0 COMPLICATIONS PRECLUDING THE CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

Developing and promulgating concentration-based treatment standards for the U and P wastes regulated in this document was not feasible due to difficulties in either (1) quantifying the particular U or P waste constituent in hazardous waste matrices; or (2) applying the U and P waste treatment standard calculation methodology to the available treatment data. The specific complications precluding the calculation of a concentration-based treatment standard for each U and P waste are identified in Table 3-1 (at the end of this section) and are discussed in greater detail below.

3.1 Analytical Complications

Complications arise in the process of analyzing many U and P wastes because the constituents of concern cannot be reliably quantified in hazardous waste matrices. These complications preclude the establishment of concentration-based treatment standards. As a result, the Agency must establish methods of treatment as the treatment standards for these wastes. The four most common analytical complications for these wastes are as follows:

- No EPA-approved methods exist that are currently verified and demonstrated for the reliable quantification of the constituents of concern in treatment residuals;
- Calibration standards for the constituents of concern are not currently available in the commercial market;
- The compound is unstable in water or may react with water; and
- The listed waste does not represent a single chemical entity.

These complications are explained in more detail in the following subsections.

3.1.1 Unavailability of a Verified Analytical Method

Some U and P waste constituents are not amenable to quantification in hazardous waste matrices because SW-846 analytical methods have not yet been established for their analysis. These compounds are not target analytes for any known analytical methodologies. As a result, no verified methods are available for their analysis and the stability, accuracy, and precision of analytical results have not been determined.

For some U and P waste constituents, only high-performance liquid chromatography (HPLC) analytical methods can be used to measure their concentrations. Although HPLC techniques have been used to quantify certain compounds in relatively clean aqueous matrices, the Agency has not completely verified that HPLC is appropriate for analysis of either untreated wastes or treatment residuals. There is only one HPLC method that is currently listed in SW-846 as applicable for analysis of solid wastes, with limited applicability. Until validation of this method is completed, the Agency does not believe that it should establish concentration-based treatment standards for U and P waste constituents based on data from HPLC analyses.

In other cases, SW-846 analytical methods have been established for the analysis of particular U and P waste constituents; however, analytical problems have been documented which significantly impact the accuracy of the data obtained using these methods. Until these problems can be resolved, the Agency does not believe that it should establish concentration-based treatment standards for U and P waste constituents based on data from these analyses.

3.1.2 Commercial Unavailability of Calibration Standards

Solutions of known purity and concentration of a chemical or mix of chemicals are often referred to as calibration standards. These standards are used by analytical laboratories to verify the accuracy and precision of an analysis for a particular chemical or group of chemicals. The continued availability of these standards from commercial chemical suppliers is necessary to maintain proper quality assurance/quality control of quantitative analysis for constituents in treatment residuals, as required by the facility analytical plan as part of the Part B permit requirement.

EPA determined which calibration standards are commercially available by asking five major suppliers whether they had the chemicals in stock and whether they were available for shipment to prospective buyers. Unless a compound is consistently in stock at major suppliers, the Agency believes that the difficulties in obtaining these calibration standards and in verifying their purity are sufficient cause not to establish concentration-based treatment standards for these constituents in U and P wastes.

3.1.3 Instability in Water

Some U and P compounds dissociate, decompose, or otherwise significantly change their identity when exposed to water. EPA is not establishing concentration-based treatment standards for these compounds because some moisture is typically inherent in most treatment residuals, particularly in wastes classified as wastewaters. Thus, while analytical methods may exist for some of these "unstable" compounds when measured in nonaqueous and certain aqueous matrices, accurate quantification of their concentrations in treatment residuals where there is a reasonable expectation that water may be present would be severely hampered. Additionally, several constituents represented by U and P codes were excluded from 40 CFR 264 Appendix IX (and therefore the BDAT List) due to their instability in water.

3.1.4 Multiple Chemical Identity

For several U and P waste codes, the specific listing for that waste code does not identify only one constituent for which the listing applies (e.g., P075 is listed as "Nicotine and salts" and P051 is listed as "Endrin and metabolites").

In cases where the U or P listing does not specify particular isomers and there are a limited number of isomers, treatment standards typically are reported as applicable to all isomers, are isomer-specific, or are applicable to the sum of the isomers depending on whether the identity of isomers can be distinguished.

When the U or P waste code specifies "and salts" or "and metabolites," the Agency typically chooses to specify a method of treatment as the treatment standard rather than to establish a concentration-based standard to preclude analysis for a particular chemical that may not have been present originally.

3.2 Complications Associated with the Treatability Database

Some of the U and P waste codes included in this document are amenable to quantification in hazardous waste matrices; however, methods of treatment were specified as the treatment standards due to complications encountered in applying the treatment standard calculation methodology for U and P wastes to the treatment performance data available for particular wastes. The affected U and P codes are:

- P003 - Acrolein;
- U042 - 2-Chloroethyl vinyl ether;
- U091 - 3,3'-Dimethoxybenzidine; and
- U095 - 3,3'-Dimethylbenzidine.

Treatment standards for wastewater forms of the U and P wastes that are amenable to quantification in hazardous waste matrices were calculated based on treatment performance data from various sources, including: (1) the Office of Water's Industrial Technology Division (ITD) (specifically from the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) data base); (2) the Office of Solid Waste's BDAT data (from previous land disposal restrictions rules); (3) National Pollution Discharge Elimination System (NPDES) data; (4) the Hazardous Waste Engineering Research Laboratory (HWERL) database; and (5) additional wastewater treatment data from literature articles on wet air oxidation and PACT^{R}. Wastewater treatment performance data were not available for the constituent of concern in U091 and U095 and data appropriate for transfer to these constituents could not be identified. Therefore, concentration-based treatment standards could not be calculated and a method of treatment was established for the wastewater forms of U091 and U095.

Treatment standards for nonwastewater forms of the U and P wastes that are amenable to quantification in hazardous waste matrices were calculated based on detection limits for incinerator ash residuals collected during the 14 BDAT incineration treatment tests (listed in Table 4-1) performed by EPA for the BDAT Land Disposal Restrictions Program. Concentration-based treatment standards were calculated by multiplying the constituent detection limit by an accuracy correction factor and by a variability factor. For the nonwastewater forms of P003, U042, U091, and U095, the range of detection limits for these U and P wastes spanned several orders of magnitude, suggesting that analyses for these constituents are difficult in incinerator ash matrices due to matrix interferences. The treatment standards that were then calculated based on these data were 1,000 ppm or greater. The establishment of treatment standards at these levels would not ensure substantial treatment for the constituents of concern. Therefore, for these constituents, in nonwastewater forms of these U and P wastes, the Agency is specifying a method of treatment as the BDAT treatment standard, rather than establishing concentration-based treatment standards.

Table 3-1

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Waste Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
P001	Warfarin (>0.3%)		X						
P002	1-Acetyl-2-thiourea		X						
P003	Acrolein								X
P005	Allyl alcohol	X							
P007	5-Aminomethyl-3-isoxazolol		X						
P008	4-Aminopyridine	X							
P014	Thiophenol (Benzenethiol)			X					
P016	Bis(chloromethyl)ether						X		
P017	Bromoacetone	X							
P018	Brucine		X						
P022	Carbon disulfide			X					
P023	Chloroacetaldehyde						X		
P026	1-(o-Chlorophenyl)thiourea		X						
P027	3-Chloropropionitrile			X					
P028	Benzyl chloride						X		
P034	2-Cyclohexyl-4,6-dinitrophenol				X				
P042	Epinephrine	X							
P045	Thiofanox				X				
P046	alpha,alpha-Dimethylphenethylamine				X				
P047	4,6-Dinitro-o-cresol salts					X			

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
P049	2,4-Dithiobiuret		X						
P054	Aziridine		X						
P057	Fluoroacetamide		X						
P058	Fluoroacetic acid, sodium salt	X							
P064	Isocyanic acid, methyl ester						X		
P066	Methomyl		X						
P067	2-Methylaziridine		X						
P069	Methyllactonitrile						X		
P070	Aldicarb		X						
P072	1-Naphthyl-2-thiourea		X						
P075	Nicotine and salts		X						
P082	N-Nitrosodimethylamine			X					
P084	N-Nitrosomethylvinylamine	X							
P088	Endothall		X						
P093	N-Phenylthiourea		X						
P095	Phosgene						X		
P102	Propargyl alcohol	X							
P108	Strychnine and salts		X						
P116	Thiosemicarbazide		X						
P118	Trichloromethanethiol	X							

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
U001	Acetaldehyde	X							
U003	Acetonitrile			X					
U006	Acetyl chloride						X		
U007	Acrylamide		X						
U008	Acrylic acid	X							
U010	Mitomycin C		X						
U011	Amitrole		X						
U014	Auramine		X						
U015	Azaserine		X						
U016	Benz(c)acridine				X				
U017	Benzal chloride						X		
U020	Benzene sulfonyl chloride	X							
U021	Benzidine			X					
U026	Chlornaphazine		X						
U033	Carbonyl fluoride						X		
U034	Trichloroacetaldehyde (Chloral)						X		
U035	Chlorambucil		X						
U038	Chlorobenzilate								
U041	1-Chloro-2,3-epoxypropane (Epichlorohydrin)						X		
U042	2-Chloroethyl vinyl ether								X

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

Code	Constituent	Verified Analytical Method Unavailable					Unstable In Water		
		No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
U046	Chloromethyl methyl ether						X		
U049	4-Chloro-o-toluidine hydrochloride	X							
U053	Crotonaldehyde						X		
U055	Cumene	X							
U056	Cyclohexane							X	
U057	Cyclohexanone			X					
U059	Daunomycin		X						
U062	Diallate		X						
U064	1,2,7,8-Dibenzopyrene				X				
U073	3,3'-Dichlorobenzidine			X					
U074	cis-1,4-Dichloro-2-butene			X					
U074	trans-1,4-Dichloro-2-butene			X					
U085	1,2:3,4-Diepoxybutane	X							
U089	Diethylstilbestrol		X						
U090	Dihydrosafrole				X				
U091	3,3'-Dimethoxybenzidine								X
U092	Dimethylamine	X							
U093	p-Dimethylaminoazobenzene			X					
U094	7,12-Dimethyl benz(a)anthracene				X				
U095	3,3'-Dimethylbenzidine								X

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
U097	Dimethylcarbamoyl chloride						X		
U110	Dipropylamine	X							
U113	Ethyl acrylate	X							
U114	Ethylene bis-dithiocarbamic acid		X						
U116	Ethylene thiourea		X						
U119	Ethyl methanesulfonate						X		
U122	Formaldehyde	X							
U123	Formic acid	X							
U124	Furan	X							
U125	Furfural	X							
U126	Glycidylaldeyde						X		
U132	Hexachlorophene			X					
U143	Lasiocarpine		X						
U147	Maleic anhydride						X		
U148	Maleic hydrazide		X						
U149	Malononitrile	X							
U150	Melphalan		X						
U153	Methanethiol	X							
U154	Methanol								X
U156	Methyl chlorocarbonate	X							

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
U163	N-Methyl-N-nitro-N-nitrosoguanidine	X							
U164	Methylthiouracil		X						
U166	1,4-Naphthoquinone			X					
U167	1-Naphthylamine			X					
U168	2-Naphthylamine			X					
U171	2-Nitropropane			X					
U173	N-Nitrosodiethanolamine	X							
U176	N-Nitroso-N-ethylurea	X							
U177	N-Nitroso-N-methylurea	X							
U178	N-Nitroso-N-methylurethane	X							
U182	Paraldehyde						X		
U184	Pentachloroethane			X					
U186	1,3-Pentadiene	X							
U191	2-Picoline								
U193	1,3-Propane sultone		X						
U194	n-Propylamine	X							
U197	p-Benzoquinone			X					
U200	Reserpine		X						
U201	Resorcinol			X					
U202	Saccharin and salts					X			

Table 3-1 (Continued)

COMPLICATIONS PRECLUDING CALCULATION OF CONCENTRATION-BASED TREATMENT STANDARDS

		Verified Analytical Method Unavailable					Unstable In Water		
Code	Constituent	No SW-846 Method Available	Only HPLC Methods Available; Not Good For Complex Matrices	Analysis May Present Problems	Standards Not Commercially Available	Chemical Group, Not Single Constituent	BDAT Constituent Unstable In Water	Constituent Not Included In 40 CFR Part 264 Appendix IX	Magnitude Of Numerical Standard Does Not Represent Substantial Treatment
U206	Streptozotocin		X						
U213	Tetrahydrofuran	X							
U218	Thioacetamide		X						
U219	Thiourea		X						
U222	o-Toluidine hydrochloride	X							
U234	sym-Trinitrobenzene	X							
U236	Trypan blue		X						
U237	Uracil mustard				X				
U238	Ethyl carbamate		X						
U240	2,4-Dichlorophenoxyacetic salts and esters					X			
U244	Thiram	X							
U248	Warfarin ($\leq$0.3%)		X						

4.0 IDENTIFICATION OF APPLICABLE, DEMONSTRATED, AND BEST TECHNOLOGY

This section presents the Agency's rationale for determining the best demonstrated available technology (BDAT) for treating U and P wastes for which concentration-based treatment standards could not be calculated. These standards could not be calculated due to difficulties in either (1) quantifying the particular U or P waste constituent in hazardous waste matrices; or (2) applying the U and P waste treatment standard calculation methodology to the available treatment data.

This section presents the Agency's determination of:

- Applicable technologies;
- Demonstrated technologies; and
- The best demonstrated available technology (BDAT) for treatment of these wastes.

In determining BDAT, the Agency first determines which technologies are potentially applicable for treatment of the waste(s) of interest. The Agency then determines which of the applicable technologies are demonstrated for treatment of the waste(s) of interest. Next, the Agency determines which of the demonstrated technologies is "best" for the purpose of establishing BDAT. Finally, the Agency determines whether the best demonstrated technology is "available" for treatment of the waste(s) of interest.

4.1 Applicable Treatment Technologies

To be applicable, a technology must theoretically be usable to treat the waste in question or a waste that is similar in terms of parameters that affect treatment selection. The following subsections present applicable treatment technologies for nonwastewater and wastewater forms of the U and P wastes included in this document. Detailed descriptions of technologies that are applicable to treat listed hazardous wastes are provided in EPA's Treatment Technology Background Document (Reference 3).

4.1.1 Nonwastewaters

Since nonwastewater forms of the U and P wastes generally contain hazardous organic constituents at treatable concentrations, applicable treatment technologies include those that destroy or reduce the total amount of various organic compounds in the waste. The Agency has identified the following treatment technologies as applicable for these wastes:

- Incineration (fluidized-bed, rotary kiln, and liquid injection);
- Fuel substitution;
- Solvent extraction followed by incineration or recycle of the extract;
- Critical fluid extraction followed by incineration of the contaminated solvents;
- Wet air oxidation;
- Chemical oxidation; and
- Distillation.

Total recycle or reuse may also be applicable for certain wastes, such as off-specification commercial chemical products. These treatment technologies were identified based on current waste treatment practices and engineering judgment.

Many of the U and P wastes addressed in this background document are generated in a variety of physical forms. The physical form of the waste may govern the selection of the actual type of applicable treatment technology. For example, a contaminated soil may be amenable to rotary kiln incineration, while an off-specification liquid chemical product may be amenable to liquid injection incineration.

Incineration

Incineration is a destruction technology in which energy, as heat, is transferred to the waste to destabilize chemical bonds and destroy hazardous organic constituents. The three types of incinerator design applicable to U and P organic wastes are fluidized-bed, rotary kiln, and liquid injection incineration.

In a fluidized-bed incinerator, solid and semi-solid wastes are injected into the fluidized-bed material (generally sand and/or incinerator ash), where it is heated to its ignition temperature. Heat energy from the combustion reactions is then transferred back to the fluidized-bed. Ash is removed periodically during operation and during bed change-outs.

In a rotary kiln incinerator, solid and semi-solid wastes are fed into the elevated end of the kiln, and the rotation of the kiln mixes the waste with hot gases to heat the waste to its ignition temperature. Ash is removed from the lower end of the kiln. Combustion gases from the kiln enter the afterburner for complete destruction of organic waste constituents. Other wastes may also be injected into the afterburner.

In a liquid injection incinerator, liquid wastes are atomized and injected into the incinerator. In general, only wastes with low or negligible ash contents are amenable to liquid injection incineration. Therefore, this technology generally does not generate an ash residual.

Combustion gases from the incinerator are then fed to a scrubber system for cooling and removal of entrained particulates and acid gases, if present. In general, with the exception of liquid injection incineration, two residuals are generated by incineration processes: ash and scrubber water. Further treatment of organics in ash or scrubber water should not be required.

Fuel Substitution

Fuel substitution is a destruction technology in which energy, as heat, is transferred to the waste to destabilize chemical bonds and destroy organic constituents. Fuel substitution differs from incineration in that the waste is used as a fuel in industrial furnaces or boilers. Two residuals may be generated by the fuel substitution process: ash and scrubber water. Further treatment of organics in ash or scrubber water should not be required.

Solvent Extraction

Solvent extraction is a separation technology in which organics are removed from the waste due to greater constituent solubility in the solvent phase than in the waste phase. This technology generates two residuals: a treated waste residual and a treated waste extract. The extract may be recycled or may be destroyed by incineration.

Critical Fluid Extraction

Critical fluid extraction is a solvent extraction technology in which the solvent is brought to its critical state (liquid gas) to aid in the extraction of hazardous organic constituents from the wastes. After the extraction step, the solvent is returned to its normal gaseous state, generating a small volume of extract that is concentrated in hazardous organic constituents. This technology generates two residuals: a treated waste residual and a treated waste extract. The extract may be recycled or may be destroyed by incineration.

Wet Air Oxidation

Wet air oxidation is a destruction technology in which hazardous organic constituents in wastes are oxidized and destroyed under pressure at elevated temperatures in the presence of dissolved oxygen. This technology is applicable for wastes comprised primarily of water and up to 10% total organic constituents. Wet air oxidation generates one treatment residual: treated effluent. The treated effluent may require further treatment for hazardous organic constituents by carbon adsorption (this technology is described in Section 4.1.2). Air emissions from wet air oxidation may require further treatment by incineration.

Chemical Oxidation

Chemical oxidation is a treatment technology that may be used to treat wastes containing organics and, in some cases, to treat sulfide and cyanide wastes. The basic principle of chemical oxidation is that some dissolved organic compounds, inorganic cyanides, and sulfides are chemically oxidized to yield carbon dioxide, water, salts, simple organic acids, and, in the case of sulfides, sulfates. The principal chemical oxidants used are hypochlorite, chlorine gas, chlorine dioxide, hydrogen peroxide, ozone, and potassium permanganate. Chemical oxidation generates an aqueous waste stream which is either discharged or transferred to another process for further treatment.

Distillation

Distillation is the separation of a liquid mixture into various components by a process of vaporization and condensation. As a treatment technology, distillation is applicable to the treatment of wastes containing organics that are volatile enough to be removed by the application of heat. This technology generates an organic stream that may be reusable and a bottom stream that is often incinerated.

Total Recycle or Reuse

Total recycle or reuse of a waste in the same process or another process eliminates the generation of the waste and consequently generates no treatment residuals. Total recycle or reuse may be applicable for certain U and P wastes, such as off-specification products.

4.1.2 Wastewaters

Since wastewater forms of the U and P wastes may contain hazardous organic constituents at treatable concentrations, applicable technologies include those that destroy or reduce the total amount of various organic compounds in the waste. Therefore, the Agency has identified the following treatment technologies as potentially applicable for treatment of these wastes:

- Incineration (fluidized-bed, rotary kiln, and liquid injection);
- Wet air oxidation;
- Biological treatment;
- Carbon adsorption;
- Solvent extraction followed by incineration or recycle of the extract;
- Chemical oxidation;
- Distillation; and
- Steam stripping.

Total recycle or reuse may also be applicable for certain wastewaters. These treatment technologies were identified based on current waste treatment practices and engineering judgment.

The concentrations and type(s) of waste constituents present in the waste generally determine which technology is most applicable. Carbon adsorption, for example, is often used as a polishing step following primary treatment by biological treatment, solvent extraction, or wet air oxidation. Typically, carbon adsorption is applicable for treatment of wastewaters containing less than 0.1% total organic constituents. Wet air oxidation, biological treatment, and solvent extraction are applicable for treatment of wastewaters containing up to 1% total organic constituents. Many of the wastewaters that are the subject of this document may contain constituents that are too toxic to biomass and therefore cannot be treated effectively by biological treatment.

Incineration

The description of incineration of nonwastewaters was given previously in Section 4.1.1. This description also applies to the incineration of wastewaters, particularly that of liquid injection incineration.

Wet Air Oxidation

The description of wet air oxidation of nonwastewaters was previously described previously in Section 4.1.1. This description also applies to the wet air oxidation of wastewaters.

Biological Treatment

Biological treatment is a destruction technology in which hazardous organic constituents in wastewaters are biodegraded. This technology generates two treatment residuals: a treated effluent and a waste biosludge. Waste biosludge may be land-disposed without further treatment if it meets the BDAT treatment standard for the nonwastewater form of the waste.

Carbon Adsorption

Carbon adsorption is a separation technology in which hazardous organic constituents in wastewaters are selectively adsorbed onto activated carbon. This technology generates two treatment residuals: a treated effluent and spent activated carbon. The spent activated carbon can be reactivated and recycled.

Solvent Extraction

The description of solvent extraction of nonwastewaters was given previously in Section 4.1.1. This description also applies to the solvent extraction of wastewaters.

Chemical Oxidation

The description of chemical oxidation of nonwastewaters was given previously in Section 4.1.1. This description also applies to the chemical oxidation of wastewaters.

Distillation

The description of distillation of nonwastewater was given previously in Section 4.1.1. This description also applies to the distillation of wastewaters.

Steam Stripping

Steam stripping is a form of distillation applicable to the treatment of wastewaters containing organics that are volatile enough to be removed by the application of heat, using steam as the heat source. The constituents that are volatilized are then condensed and typically either reused or further treated by liquid injection incineration. Typically, steam stripping is applied where there is less than 1% volatile organics in the waste.

Total Recycle or Reuse

Total recycle or reuse of a waste in the same process or another process eliminates the generation of the waste and consequently generates no treatment residual.

4.2 Demonstrated Treatment Technologies

To be demonstrated, a technology must be employed in full-scale operation for treatment of the waste in question or a similar waste. Technologies available only at pilot- or bench-scale operations are not considered in identifying demonstrated technologies.

4.2.1 Nonwastewaters

The Agency has identified incineration as a demonstrated technology for treatment of nonwastewater forms of the U and P wastes included in this document. For the land disposal restrictions program, the Agency tested rotary kiln incineration on a full-scale operational basis for the following waste constituents:

Aromatic and other Hydrocarbon Wastes

Toluene

Brominated Organic Wastes

1,2-Dibromoethane (ethylene dibromide)

Halogenated Aliphatic Wastes

Bis(2-chloroethyl)ether
1,1-Dichloroethane
1,1,1-Trichloroethane
1,2,4-Trichlorobenzene

Halogenated Pesticide and Chlorobenzene Wastes

Hexachlorocyclopentadiene
Chlordane
Heptachlor
Chlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene
Hexachlorobenzene
Pentachlorobenzene
Pentachloronitrobenzene
1,2,4,5-Tetrachlorobenzene
2,4-Dichlorophenoxyacetic acid
Methoxychlor
Hexachlorobutadiene

Oxygenated Hydrocarbon and Heterocyclic U and P Wastes

Acetone
Ethyl acetate
Methyl ethyl ketone
Methyl isobutyl ketone
1,4-Naphthoquinone

Wastes of a Pharmaceutical Nature

Isosafrole

Phenolic Wastes

2-sec-Butyl-4,6-dinitrophenol (Dinoseb)
o-Cresol
p-Cresol
Phenol

Polynuclear Aromatic Wastes

Benzo(a)pyrene
Chrysene
Indeno(1,2,3-cd)pyrene
Benz(a)anthracene
Fluoranthene
Naphthalene

Organo-Nitrogen Compound Wastes

Acetonitrile
Acrylonitrile
Aniline
Nitrobenzene
Pyridine

Miscellaneous Halogenated Organic Wastes

Chloromethane
Dichlorodifluoromethane
Vinyl chloride
Bis(2-chloroethyl)ether
3,3'-Dichlorobenzidine
Pronamide

The Agency believes that since incineration is demonstrated for treatment of these waste constituents, incineration is also demonstrated for all of the U and P wastes included in each treatability group. As discussed in Section 2.0, similar chemical and physical properties are exhibited by the constituents in each treatability group. Incineration should be able to destabilize and destroy, in a similar fashion, waste constituents which exhibit similar chemical structures. Therefore, incineration is expected to successfully treat all of the U and P wastes in each treatability group. Complete discussions of test methods and presentations of analytical data are available in the on-site engineering reports (OERs) for the tests. (A list of the treatment tests conducted by the Agency as part of the BDAT Land Disposal Restrictions Program, along with references for the corresponding OERs and background documents, is provided in Table 4-1 at the end of this section.)

No technologies have been identified as demonstrated for treatment of organo-sulfur nonwastewaters. However, the Agency believes that incineration is also demonstrated for organo-sulfur compound wastes because they are similar in chemical structure to other chlorinated organo-sulfur wastes in the miscellaneous halogenated organic waste treatability group that have been successfully treated by incineration on a full-scale operational basis. In addition, the Agency believes that incineration is demonstrated on a full-scale operational basis for treatment of aromatic and polynuclear aromatic nonwastewaters based on a review of data provided by many of the treaters of these U-wastes identified in the 1986 TSDR Survey (Reference 4).

The Agency is not aware of any facilities that treat these wastes by fuel substitution; however, the Agency believes that fuel substitution is demonstrated for wastes that are more difficult to treat, such as K027, K111-K116, U221, and U223. These wastes contain dinitrotoluene, toluenediamine, and toluene diisocyanate, which tend to polymerize and are therefore considered by the Agency to be more difficult to treat than the U and P wastes included in this document. Therefore, the Agency believes that fuel substitution is a demonstrated technology for the U and P nonwastewaters included in this document.

From review of the 1986 TSDR Survey (Reference 4) and the USEPA's Water Engineering Research Laboratory (WERL) database (Reference 5), the Agency determined that some facilities also treat nonwastewater forms of aromatic and polynuclear aromatic wastes or wastes judged to be similar on a full-scale operational basis using wet air oxidation, chemical oxidation, and distillation; therefore, EPA believes that these technologies are also demonstrated (on a full-scale basis) for aromatic and polynuclear aromatic wastes.

The Agency is not aware of any facilities that treat nonwastewater forms of these wastes or wastes judged to be similar on a full-scale operational basis using solvent extraction or critical fluid extraction; therefore, EPA believes that these technologies are not currently demonstrated for these wastes.

Total recycle or reuse is demonstrated for treatment of several off-specification pesticide nonwastewaters as determined from telephone contacts with pesticide manufacturers, formulators, and packagers. The Agency is not aware of any other types of facilities that conduct total recycle or reuse of wastes in other U and P treatability groups included in this document. Therefore, recycle and reuse is not considered to be demonstrated for any of these other wastes at this time.

4.2.2 Wastewaters

The following technologies have been identified as demonstrated for treatment of the following waste constituents (organized by chemical structure):

Aromatic and Other Hydrocarbon Wastes

Incineration
Biological Treatment
Carbon Adsorption
Wet Air Oxidation
Chemical Oxidation
Steam Stripping

Brominated Organic Wastes

Biological Treatment

Halogenated Aliphatic Wastes

Incineration
Wet Air Oxidation
Chemical Oxidation
Biological Treatment
Carbon Adsorption
Solvent Extraction
Distillation
Steam Stripping

Halogenated Pesticide and Chlorobenzene Wastes

Biological Treatment
Wet Air Oxidation
Steam Stripping
Carbon Adsorption

Oxygenated Hydrocarbon and Heterocyclic Wastes

Biological Treatment
Carbon Adsorption
Steam Stripping
Wet Air Oxidation

Wastes of a Pharmaceutical Nature

Wet Air Oxidation

Phenolic Wastes

Wet Air Oxidation
Carbon Adsorption
Biological Treatment
Chemical Oxidation
Solvent Extraction
Steam Stripping

Polynuclear Aromatic Wastes

Incineration
Biological Treatment
Carbon Adsorption
Wet Air Oxidation
Chemical Oxidation
Steam Stripping

Organo-Nitrogen Compound Wastes

Biological Treatment
Carbon Adsorption
Steam Stripping
Wet Air Oxidation
Solvent Extraction

Miscellaneous Halogenated Organic Wastes

Biological Treatment
Steam Stripping
Carbon Adsorption
Solvent Extraction followed by Steam Stripping followed by Carbon Adsorption
Chemical Oxidation
Wet Air Oxidation

No technologies have been identified as demonstrated for treatment of organo-sulfur compound wastewaters. The Agency believes, however, that since these wastes are similar in chemical structure to chlorinated organo-sulfur wastes in the miscellaneous halogenated organic waste treatability group, treatment technologies identified as demonstrated for miscellaneous halogenated organic wastewaters are also demonstrated for organo-sulfur compound wastewaters.

For some of the waste groups, the Agency is not aware of any facilities that incinerate wastewater forms of the U and P wastes. However, commenters to the Second Third proposed rule indicated that they were indeed incinerating many wastewaters and that they did not want to be precluded from doing so. In addition, the Agency has conducted incineration tests which demonstrate that incineration is an effective treatment technology for a wide variety of U and P organic compounds - halogenateds and nonhalogenateds - and pesticides. EPA's evidence that incineration constitutes significant treatment for these compounds is that these compounds were analyzed at or near their detection limits in the ash and scrubber water from these tests. These compounds have similar chemical structures and physical properties to the compounds in all of the waste treatability groups represented in this document. Since incineration is demonstrated for treatment of waste constituents in nonwastewater forms of these wastes as discussed in Section 4.2.1, the

Agency believes incineration is also demonstrated for these waste constituents in wastewater forms of these wastes. Therefore, the Agency is also identifying incineration as a demonstrated technology for wastewaters.

The Agency is aware of several facilities that recycle and reuse off-specification halogenated pesticides and chlorobenzene, halogenated phenolic, and phenolic U and P wastes. Therefore, recycle and reuse is considered to be demonstrated for these wastes. The Agency is not aware of any facilities generating U and P wastes in the other waste groups that do so. Therefore, recycle and reuse is not considered to be demonstrated for these wastes at this time.

Based on engineering judgment, the Agency considers the following technologies to be demonstrated for wastewater forms of the U and P wastes included in this document:

- Distillation;
- Solvent extraction;
- Steam stripping;
- Biological treatment;
- Wet air oxidation;
- Chemical oxidation;
- Carbon adsorption; and
- Incineration.

4.3 Identification of Best Demonstrated Available Treatment Technology (BDAT)

Best demonstrated technology is determined based on a thorough review of all the treatment data available on the waste of concern or wastes judged to be similar. Following the identification of "best," the Agency determines whether the technology is "available." An available treatment technology is one that (1) is not a proprietary or patented process that cannot be purchased or licensed from the proprietor (i.e., it must be commercially available), and (2) substantially diminishes the toxicity of the waste or substantially reduces the likelihood of migration of hazardous constituents from the waste.

4.3.1 Nonwastewaters

For a treatment technology to be identified as "best," the treatment performance data are first screened to determine:

- Whether the data represent operation of a well-designed and well-operated treatment system;
- Whether sufficient analytical quality assurance/quality control measures were employed to ensure the accuracy of the data; and
- Whether the appropriate measure of performance was used to assess the performance of the particular treatment technology.

As discussed previously, distillation, chemical oxidation, wet air oxidation, fuel substitution, and incineration are all demonstrated treatment technologies for nonwastewater forms of U and P wastes.

The Agency has obtained a large amount of incinerator ash analytical data from the 14 BDAT land disposal restrictions program treatment tests, conducted at what EPA considers to be well-designed and well-operated hazardous waste incinerators. Strict quality assurance/quality control measures were employed to ensure the accuracy of the data, and since EPA was collecting these data to identify and characterize BDAT treatment technologies, appropriate performance variables, namely, U and P waste constituent concentrations in treated and untreated waste, were measured. Based on this data and other information, the Agency has determined that due to the high temperatures, efficient mixing, and consistent residence times used at commercial hazardous waste incinerators, incineration processes are relatively indiscriminate in the destruction of organics. Based on the treatability data available, the Agency considers incineration to be a "best" technology for the treatment of nonwastewater forms of U and P wastes. The Agency believes that since incineration is BDAT for wastes amenable for quantification within each treatability group, incineration would also be BDAT for all of the wastes in each group.

The Agency does not have analytical data characterizing the treatment performance of fuel substitution on nonwastewater forms of unquantifiable

U and P wastes; however, based on the significant energy recovery value of some U and P wastes, the Agency believes that fuel substitution may qualify as a "best" technology for these wastes.

EPA is concerned, though, that using those U and P wastes, which contain sulfur, nitrogen, and halogens, as fuel to boilers and furnaces may result in unregulated SO_x, NO_x, and halogen emissions. As a result, the Agency considers fuel substitution to be a "best" technology only for nonwastewater forms of U and P wastes which contain carbon, hydrogen, and/or oxygen in their molecular structure. Fuel substitution is not considered a "best" technology for nonwastewater forms of U and P wastes which contain sulfur, nitrogen, or halogens in their molecular structure.

The Agency has very little analytical data characterizing treatment performance of chemical oxidation, wet air oxidation, or distillation on nonwastewater forms of U and P wastes. The only data available is limited to the treatment of certain aromatic and polynuclear aromatic U and P wastes. EPA does not have any basis for transferring this treatability data to other U and P waste treatability groups; therefore, the Agency does not consider chemical oxidation, wet air oxidation, or distillation to be "best" technologies for the treatment of nonwastewater forms of unquantifiable U and P wastes.

Incineration is a commercially available technology. Additionally, treatment performance data from the 14 BDAT incineration treatment tests (Table 4-1) show substantial treatment by incineration for waste constituents of concern and other similar constituents in nonwastewater forms of unquantifiable U and P wastes. Therefore, incineration is an "available" treatment technology for these wastes for the purpose of establishing BDAT.

Fuel substitution, according to industry comments, is also a commercially available technology. Fuel substitution typically takes place in cement kilns, industrial boilers and furnaces, and other commercial combustion chambers. The Agency believes that fuel substitution substantially decreases the toxicity of applicable U and P wastes (i.e., compounds containing only carbon, hydrogen, and/or oxygen) since organic constituents should similarly be destroyed incinerators and industrial boilers and furnaces. Therefore, fuel substitution is an "available" treatment technology for those wastes for the purpose of establishing BDAT.

Incineration has been determined to be BDAT for all of the nonwastewaters that cannot be quantified in hazardous waste matrices using current analytical methods, based on similarities in chemical and physical properties. Additionally, the Agency believes that the combustion characteristics of U and P wastes with high energy value are essentially the same, regardless of whether they are incinerated or used as fuel in industrial boilers and furnaces. As a result, the Agency has determined that fuel substitution is also BDAT for the unquantifiable U and P nonwastewaters that contain only carbon, hydrogen, and/or oxygen in their chemical structure.

4.3.2 Wastewaters

As discussed previously, distillation, solvent extraction, steam stripping, biological treatment, wet air oxidation, chemical oxidation, carbon adsorption, and incineration are all demonstrated technologies for U and P wastewaters.

The Agency believes that the best technologies for treating the U and P wastewaters, for which methods of treatment are being promulgated as treatment standards, are those technologies that destroy the U and P constituents. Steam stripping, solvent extraction, and distillation are technologies that remove the U and P constituents from the wastewater stream; however, the waste constituents are not destroyed but are transferred to a more concentrated waste stream, i.e., the condensate, extract, or bottom stream (or still bottoms). This waste stream would require further treatment before disposal. As a result, the Agency does not consider steam stripping, solvent extraction, or distillation to be best technologies for treating wastewater forms of the U and P wastes covered in this document.

The fact that a technology removes waste constituents, but does not destroy them, does not necessarily preclude it from being considered "best." As discussed below, carbon adsorption is being promulgated as part of the chemical and wet air oxidation treatment trains. The purpose of the carbon adsorption step as part of this treatment train is to remove organic oxidation by-products resulting from the oxidation of U and P waste constituents. Carbon adsorption was selected for this removal step over steam stripping, solvent extraction, and distillation because the Agency believes that carbon adsorption is the most appropriate removal technology for the widest range of organic compounds likely to be present in the oxidation effluent stream.

Biological treatment is not considered to be the best technology for treatment of these organic U and P wastewaters since concentrations of these wastes in the influent to the biological treatment unit cannot be measured. Therefore, the treatment unit operators cannot control the levels of these wastes reaching the working organisms in the biological treatment unit. The risk of sending unmeasurable quantities of these wastes to a biological treatment unit includes the possibility of shock loads that would disable the plant's working organisms, allowing these wastes to exit untreated in the effluent until the biological treatment system could be restored to working order.

Wet air oxidation and chemical oxidation provide treatment by oxidizing (or destroying) the BDAT constituents, or those judged to be similar, found in these wastes. However, to ensure effective treatment of these U and P wastes, treatment should include a final carbon adsorption step. Since these constituents are unquantifiable, and therefore it is not possible to accurately judge the effectiveness of wet air oxidation and chemical oxidation, the Agency believes that it is sound engineering judgment to include a final step of carbon adsorption following the oxidation. This step will ensure that these organic constituents and the oxidation by-products are removed from the wastewater matrix. Additionally, spent carbon from treating these wastewaters becomes a nonwastewater form of this waste (54 Federal Register 26630-1, June 23, 1989) and thus must be incinerated. EPA believes that incineration is the most successful method of treatment for a wide variety of organic wastes, and therefore is including carbon adsorption in the oxidation treatment train to ensure ultimate destruction of the U and P wastes present in the wastewater.

For wastewaters, in cases where the Agency has treatment performance data for demonstrated and available wastewater treatment processes and incineration (as measured by total constituent concentration in scrubber water), the Agency prefers to establish treatment standards based on the wastewater treatment processes. However, the Agency has determined that wastewaters are also treated by incineration and does not intend to preclude industry from continuing this practice. Therefore, EPA is also identifying incineration as best demonstrated technology for these wastes.

Treatment performance data included in Volume A of the Background Document for Organic U and P Wastes and Multi-Source Leachate (F039) show substantial treatment of organic constituents by wet air oxidation, carbon adsorption, and chemical oxidation. In addition, these technologies are commercially available. Therefore, these technologies are considered to be "available" treatment technologies for the purpose of establishing BDAT. As discussed in Section 4.3.1, incineration is also an "available" treatment technology for treatment of these wastes.

EPA is promulgating the following treatment trains as BDAT for U and P wastewaters that are not quantifiable. The Agency believes that all three treatment trains will ensure effective treatment (removal and destruction) of the constituents of concern. The treatment trains are:

- Chemical oxidation followed by carbon adsorption;
- Wet air oxidation followed by carbon adsorption; and
- Incineration.

Any one of the above three treatment trains may be used to meet the wastewater treatment standards for wastewater forms of these U and P wastes.

Table 4-1

WASTES TESTED BY INCINERATION

Test Number	Waste Code(s) Tested	Technology Used	Background Document Reference Number(s)	On-Site Engineering Report Reference Number(s)
1	K001-Pentachlorophenol	Rotary Kiln	7	17
2	K001-Creosote	Rotary Kiln	7	18
3	K011, K013, K014	Rotary Kiln	6	19
4	K019	Rotary Kiln	8	20
5	K024	Rotary Kiln	9	21
6	K037	Rotary Kiln	10	22
7	K048, K051	Fluidized-bed	11	23, 24
8	K087	Rotary Kiln	12	25
9	K101	Rotary Kiln	13	26
10	K102	Rotary Kiln	14	27
11	F024	Rotary Kiln	15	28
12	K015	Liquid Injection	16	29
13	D014, D016, P059a, U127a, U192a	Rotary Kiln	NA	30
14	U141[a], U028[a], P020[a], U122[a], U226[a], U239[a], U080[a], U220[a], U166[a], U161[a], U188[a]	Rotary Kiln	NA	31

NA - Not applicable.

[a] Commercial chemical products were used in these test burns as surrogates for these wastes.

5.0 DETERMINATION OF BDAT TREATMENT STANDARDS AS METHODS OF TREATMENT

EPA was unable to develop and promulgate concentration-based treatment standards for the U and P wastes covered in this document due to difficulties in either (1) quantifying the particular U or P waste constituent in hazardous waste matrices; or (2) applying the U and P waste treatment standard calculation methodology to the available treatment data. By grouping these U and P wastes into treatability groups along with U and P wastes that are amenable to treatment standard quantification, and then documenting successful treatment of the quantifiable U and P constituents, the Agency determined that these same treatment technologies could successfully treat the unquantifiable U and P constituents. As a result, EPA is setting these methods of treatment as BDAT treatment standards for the U and P waste codes covered in this volume.

The methods of treatment specified as the treatment standards for the U and P wastes covered in this volume are presented in Table 5-1 (at the end of this section). Incineration has been identified as BDAT for nonwastewater forms of these wastes. In addition, fuel substitution has been identified as BDAT for nonwastewater forms of the unquantifiable U and P wastes that contain only carbon, hydrogen, and/or oxygen in their chemical structure. Wet air oxidation followed by carbon adsorption, chemical oxidation followed by carbon adsorption, and incineration are treatment technologies judged to be of equivalent merit in treating U and P wastewaters, and therefore have been identified as BDAT for wastewater forms of these wastes. Any one of the three technologies may be used to meet the wastewater treatment standard for the wastewater forms of the U and P wastes covered in this document.

Methods of treatment are being promulgated as the BDAT treatment standards for the nonwastewater forms of several U and P wastes, U003, U038, U057, U073, U093, and U168, that are amenable to quantification in wastewater matrices (see Table 1-1). This change has been made based on information submitted by a commenter representing the hazardous waste treatment industry. The commenter reported such substantial problems, such as drastic detection limit discrepancies and extreme matrix spike recoveries, in analyzing these wastes in incinerator ash, that EPA believes that these analytes belong in the category of those constituents not amenable to quantification.

Table 5-1

BDAT TREATMENT STANDARDS FOR NONANALYZABLE U & P WASTE CODES

Regulated Constituent	Waste Code	Wastewater Document	Wastewater Standard (mg/l) *	Nonwastewater Document	Nonwastewater Standard (mg/kg) **
Warfarin (>0.3%)	P001	B	BDAT	B	BDAT-FS
1-Acetyl-2-thiourea	P002	B	BDAT	B	BDAT
Acrolein	P003	A	0.29	B	BDAT-FS
Allyl alcohol	P005	B	BDAT	B	BDAT-FS
5-Aminomethyl-3-isoxazolol	P007	B	BDAT	B	BDAT
4-Aminopyridine	P008	B	BDAT	B	BDAT
Thiophenol (Benzenethiol)	P014	B	BDAT	B	BDAT
Bis(chloromethyl)ether	P016	B	BDAT	B	BDAT
Bromoacetone	P017	B	BDAT	B	BDAT
Brucine	P018	B	BDAT	B	BDAT
Carbon disulfide	P022	A	0.014	B	BDAT
Chloroacetaldehyde	P023	B	BDAT	B	BDAT
1-(o-Chlorophenyl)thiourea	P026	B	BDAT	B	BDAT
3-Chloropropionitrile	P027	B	BDAT	B	BDAT
Benzyl chloride	P028	B	BDAT	B	BDAT
2-Cyclohexyl-4,6-dinitrophenol	P034	B	BDAT	B	BDAT
Epinephrine	P042	B	BDAT	B	BDAT
Thiofanox	P045	B	BDAT	B	BDAT
alpha,alpha-Dimethylphenethylamine	P046	B	BDAT	B	BDAT
4,6-Dinitro-o-cresol salts	P047	B	BDAT	B	BDAT
2,4-Dithiobiuret	P049	B	BDAT	B	BDAT
Aziridine	P054	B	BDAT	B	BDAT
Fluoroacetamide	P057	B	BDAT	B	BDAT
Fluoroacetic acid, sodium salt	P058	B	BDAT	B	BDAT
Isocyanic acid, methyl ester	P064	B	BDAT	B	BDAT
Methomyl	P066	B	BDAT	B	BDAT
2-Methylaziridine	P067	B	BDAT	B	BDAT
Methyllactonitrile	P069	B	BDAT	B	BDAT
Aldicarb	P070	B	BDAT	B	BDAT
1-Naphthyl-2-thiourea	P072	B	BDAT	B	BDAT
Nicotine and salts	P075	B	BDAT	B	BDAT
N-Nitrosodimethylamine	P082	A	0.40	B	BDAT
N-Nitrosomethylvinylamine	P084	B	BDAT	B	BDAT
Endothall	P088	B	BDAT	B	BDAT-FS
N-Phenylthiourea	P093	B	BDAT	B	BDAT
Phosgene	P095	B	BDAT	B	BDAT
Propargyl alcohol	P102	B	BDAT	B	BDAT-FS
Strychnine and salts	P108	B	BDAT	B	BDAT
Thiosemicarbazide	P116	B	BDAT	B	BDAT
Trichloromethanethiol	P118	B	BDAT	B	BDAT
Acetaldehyde	U001	B	BDAT	B	BDAT
Acetonitrile	U003	A	0.17	B	BDAT
Acetyl chloride	U006	B	BDAT	B	BDAT
Acrylamide	U007	A	1.0	B	BDAT
Acrylic acid	U008	B	BDAT	B	BDAT-FS
Mitomycin C	U010	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 5-1 (Continued)

BDAT TREATMENT STANDARDS FOR NONANALYZABLE U & P WASTE CODES

Regulated Constituent	Waste Code	Wastewater Document	Wastewater Standard (mg/l) *	Nonwastewater Document	Nonwastewater Standard (mg/kg) **
Amitrole	U011	B	BDAT	B	BDAT
Auramine	U014	B	BDAT	B	BDAT
Azaserine	U015	B	BDAT	B	BDAT
Benz(c)acridine	U016	B	BDAT	B	BDAT-FS
Benzal chloride	U017	A	0.055	B	BDAT
Benzene sulfonyl chloride	U020	B	BDAT	B	BDAT
Benzidine	U021	B	BDAT	B	BDAT
Chlornaphazine	U026	B	BDAT	B	BDAT
Carbonyl fluoride	U033	B	BDAT	B	BDAT
Trichloroacetaldehyde (Chloral)	U034	B	BDAT	B	BDAT
Chlorambucil	U035	B	BDAT	B	BDAT
Chlorobenzilate	U038	A	0.10	B	BDAT
1-Chloro-2,3-epoxypropane (Epichlorohydrin)	U041	B	BDAT	B	BDAT
2-Chloroethyl vinyl ether	U042	A	0.057	B	BDAT
Chloromethyl methyl ether	U046	B	BDAT	B	BDAT
4-Chloro-o-toluidine hydrochloride	U049	B	BDAT	B	BDAT
Crotonaldehyde	U053	B	BDAT	B	BDAT-FS
Cumene	U055	B	BDAT	B	BDAT-FS
Cyclohexane	U056	B	BDAT	B	BDAT-FS
Cyclohexanone	U057	A	0.36	B	BDAT-FS
Daunomycin	U059	B	BDAT	B	BDAT
Diallate	U062	B	BDAT	B	BDAT
1,2,7,8-Dibenzopyrene	U064	B	BDAT	B	BDAT-FS
3,3'-Dichlorobenzidine	U073	A	0.13	B	BDAT
cis-1,4-Dichloro-2-butene	U074	A	0.036	B	BDAT
trans-1,4-Dichloro-2-butene	U074	A	0.036	B	BDAT
1,2:3,4-Diepoxybutane	U085	B	BDAT	B	BDAT-FS
Diethylstilbestrol	U089	B	BDAT	B	BDAT
Dihydrosafrole	U090	B	BDAT	B	BDAT
3,3'-Dimethoxybenzidine	U091	A	0.13	B	BDAT
Dimethylamine	U092	B	BDAT	B	BDAT
p-Dimethylaminoazobenzene	U093	A	0.13	B	BDAT
7,12-Dimethyl benz(a)anthracene	U094	B	BDAT	B	BDAT-FS
3,3'-Dimethylbenzidine	U095	B	BDAT	B	BDAT
Dimethylcarbamoyl chloride	U097	B	BDAT	B	BDAT
Dipropylamine	U110	B	BDAT	B	BDAT
Ethyl acrylate	U113	B	BDAT	B	BDAT-FS
Ethylene bis-dithiocarbamic acid	U114	B	BDAT	B	BDAT
Ethylene thiourea	U116	B	BDAT	B	BDAT
Ethyl methanesulfonate	U119	B	BDAT	B	BDAT
Formaldehyde	U122	B	BDAT	B	BDAT-FS
Formic acid	U123	B	BDAT	B	BDAT-FS
Furan	U124	B	BDAT	B	BDAT-FS
Furfural	U125	B	BDAT	B	BDAT-FS
Glycidylaldehyde	U126	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 5-1 (Continued)

BDAT TREATMENT STANDARDS FOR NONANALYZABLE U & P WASTE CODES

Regulated Constituent	Waste Code	Wastewater		Nonwastewater	
		Document	Standard (mg/l) *	Document	Standard (mg/kg) **
Hexachlorophene	U132	B	BDAT	B	BDAT
Lasiocarpine	U143	B	BDAT	B	BDAT
Maleic anhydride	U147	B	BDAT	B	BDAT-FS
Maleic hydrazide	U148	B	BDAT	B	BDAT
Malononitrile	U149	B	BDAT	B	BDAT
Melphalan	U150	B	BDAT	B	BDAT
Methanethiol	U153	B	BDAT	B	BDAT
Methanol	U154	A	5.6	B	BDAT-FS
Methyl chlorocarbonate	U156	B	BDAT	B	BDAT
N-Methyl-N-nitro-N-nitrosoguanidine	U163	B	BDAT	B	BDAT
Methylthiouracil	U164	B	BDAT	B	BDAT
1,4-Naphthoquinone	U166	B	BDAT	B	BDAT
1-Naphthylamine	U167	B	BDAT	B	BDAT
2-Naphthylamine	U168	A	0.52	B	BDAT
2-Nitropropane	U171	B	BDAT	B	BDAT
N-Nitrosodiethanolamine	U173	B	BDAT	B	BDAT
N-Nitroso-N-ethylurea	U176	B	BDAT	B	BDAT
N-Nitroso-N-methylurea	U177	B	BDAT	B	BDAT
N-Nitroso-N-methylurethane	U178	B	BDAT	B	BDAT
Paraldehyde	U182	B	BDAT	B	BDAT-FS
Pentachloroethane	U184	B	BDAT	B	BDAT
1,3-Pentadiene	U186	B	BDAT	B	BDAT-FS
2-Picoline	U191	B	BDAT	B	BDAT
1,3-Propane sultone	U193	B	BDAT	B	BDAT
n-Propylamine	U194	B	BDAT	B	BDAT
p-Benzoquinone	U197	B	BDAT	B	BDAT-FS
Reserpine	U200	B	BDAT	B	BDAT
Resorcinol	U201	B	BDAT	B	BDAT-FS
Saccharin and salts	U202	B	BDAT	B	BDAT
Streptozotocin	U206	B	BDAT	B	BDAT
Tetrahydrofuran	U213	B	BDAT	B	BDAT-FS
Thioacetamide	U218	B	BDAT	B	BDAT
Thiourea	U219	B	BDAT	B	BDAT
o-Toluidine hydrochloride	U222	B	BDAT	B	BDAT
sym-Trinitrobenzene	U234	B	BDAT	B	BDAT
Trypan blue	U236	B	BDAT	B	BDAT
Uracil mustard	U237	B	BDAT	B	BDAT
Ethyl carbamate	U238	B	BDAT	B	BDAT
2,4-Dichlorophenoxyacetic salts and esters	U240	B	BDAT	B	BDAT
Thiram	U244	B	BDAT	B	BDAT
Warfarin (≤0.3%)	U248	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the wastes codes marked as BDAT-FS.

6.0 ACKNOWLEDGEMENTS

This background document was prepared for the U.S. Environmental Protection Agency, Office of Solid Waste, by Radian Corporation under Contract No. 68-W9-0072. This document was prepared under the direction of Richard Kinch, Acting Chief, Waste Treatment Branch; Larry Rosengrant, Section Head, Treatment Technology Section; Jerry Vorbach, Project Officer; and Lisa Jones, Project Manager. Steve Silverman served as EPA legal advisor.

The following personnel from Radian Corporation were involved in preparing this document: John Williams, Program Manager; Mary Willett, Project Director; and the Radian engineering team, Chrisanti Haretos, John Horstman, Colleen Kane, Wendy Rovansek, and Doug Spengel.

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APPENDIX A

U AND P WASTE GENERATOR INFORMATION

TABLE A-1

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U001	Acetaldehyde	Food Processing	Synthetic flavor ingredient
		Plastics and Resins Manufacturing	Manufacture of resins and plastics
		Dyes and Pigments Manufacturing	Manufacture of dyes
		Cosmetics and Fragrances	Manufacture of perfumes
		Organic Chemical Manufacturing	Chemical intermediate for pyridine, pyridine bases, pentaerythritol, 1,3-butylene glycol, chloral, glyoxal, crotonaldehyde, acetaldehyde 1,1-dimethylhydrazone, acetaldehyde cyanohydrin, acetaldehyde oxime, paraldehyde, metaldehyde, halogenated derivatives, acetaldol, sodium sulphite addition product, acetic anhydride, ethylidene diacetate, alkyl amine, ethyl acetate, isobutyl acetate, lactic acid, acetic acid, peracetic acid Monomer for polyacetaldehyde and comonomer for polymers
		Agricultural Chemical Manufacturing	Chemical intermediate for pesticides
		Film	Chemical intermediate for photographic formulations
			Alcohol denaturant
U002	Acetone	Fiber Manufacturing	Spinning solvent for cellulose acetate
		Electronic Components Manufacturing	Cleaning and drying electronic parts
		Paint Manufacturing	Solvent for paints, varnishes, lacquers
		Plastics and Resins Manufacturing	Solvent for resins and plastics
		Pharmaceutical Manufacturing	Solvent in the manufacture of pharmaceuticals
		Explosives	Manufacture of smokeless powder
		Organic Chemical Manufacturing	Solvent for fats, oils waxes Manufacture of mesityl oxide, acetic acid, diacetone, alcohol, chloroform, iodoform, bromoform, acetic anhydride Chemical intermediate for methacrylates, methyl isobutyl ketone, methyl isobutyl carbinol, bisphenol A, isophorone
		Printing	Solvent for printing inks
U003	Acetonitrile		Deodorizers for specialty naphthas
			Solvent for inorganic compounds
			Specialty solvent

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U003	(continued)		Polar solvent
			Starting material for many nitrogen-containing compounds
			Recrystallizing steroids
		Food Processing	Extraction of fatty acids from fish liver,animal&veg. oils
			Non-aqueous solvent for inorganic salts
		Metal Finishing	Brightners for metal
			Chemical intermediate -gamma-naphthaleneacetic acid,etc.
		Dyes and Pigments	In miscellaneous operations for cyanide dyes
			Medium for promoting ionization
			In electrodinetic transducers and angular accelerometers
			Solvent in non-aqueous titrations
			Starting material thiamine,acetamidine, etc.
		Organic Chemicals	Solvent in hydrocarbon extraction processes
		Pesticide Manufacturing	Chemical intermediate-pesticide manufacture
		Petroleum Refining	Coloring matter from some petroleum hydrocarbons
		Pharmaceuticals/Medicine	Separation of alkaloids from tissue extraction
U004	Acetophenone	Dyes and Pigments Manufacturing	Solvent for dyes
		Plastics and Resins Manufacturing	Specialty solvent for plastics and resins
		Organic Chemical Manufacturing	Chemical intermediate for the odorant, ethyl methyl phenylglycidate, the riot control agent, 2-chloroacetophenone, 2-bromoacetophenone, for dyes, 3-nitroacetophenone
		Food Processing	Flavoring agent in non-alcoholic beverages, ice cream, candy, baked goods, gelatins, and puddings
		Cosmetics and Fragrances	Fragrance ingredient in soaps, detergents, creams, lotions, and perfumes
		Tobacco	Flavoring in tobacco
U005	2,3-Acetylaminofluorene	Construction	In coal tar for road surfaces and roofing materials

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U005	(continued)		Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
U006	Acetyl chloride		Catalyst in chlorination of acetic acid
			Production of acetamide
			Production of acetyl sulfide
		Medicine	Testing for cholesterol
			Determination of water in inorganic liquid
			Chemical intermediate acetanilide preparation
			Chemical intermediate acetophenone reparation
		Laboratory	Qualitative organic analysis
		Specialty Chemical	Synthesis of dienestrol diacetate Production of thioacetic acid
			Chlorinating agent inorganic compounds and triarylcarbinols
			Acetylating agent
		Dyes and Pigments	Manufacture dyestuffs
		Pharmaceuticals	Pharmaceuticals manufacturing
U007	Acrylamide		Sewage and waste treatment
			Polyacrylamides manufacturing
			Flocculating aid for precip. suspended solids from aqueous systems
			Flocculants
			Cross-linking agent
		Agricultural Chemicals	In soil-conditioning agents
			In ore processing, adhesives
		Mining	Chemical intermediate in polyacrylamides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U007	(continued)	Paper and Textile	Paper and textile sizes
		Building & Construction	Construction of dam foundations & tunnels
		Dyes and Pigments	Synthesis of dyes
		Organic Chemicals Manufacturing	Reactive monomer & intermed. organic chemicals production
		Textiles	Permanent press fabrics
U008	Acrylic acid	Organic Chemical Manufacturing	Chemical intermediate for ethyl acrylate, n-butyl acrylate, methyl acrylate, 2-ethylhexyl acrylate, acrylate hydoxyethyl Monomer for polyacrylic acid and salts Comonomer with acrylamide for polymers used as polymers
			Surface coatings
		Textiles	Textile applications
		Cleaning Products	Manufacture of polishes
		Leather and Tanning	Manufacture of leather
		Plastics and Resins Manufacturing	Production of water soluble resins and salts
U009	Acrylonitrile		Chemical intermediate antioxidants synthesis
			In co-polymers with styrene and butadiene
			Chemical intermediate surface-active agents
			Comonomer for starch/acrylonitrile copolymers
		Agricultural Chemicals	Fumigant for mills and commodities (former use)
			Synthetic soil blocks
			Chemical intermediate for acrylamidoaminoethane sulfonic acid
		Plastics	Elastomers for hoses, gaskets & protective clothing
			Chemical intermediate for fatty aminopropylamine & derivs.
			Modifier for natural polymers
			Comonomer for nitrile elastomers
		Water Treatment	In flocculants for water and waste treatment
			Comonomer for alkyd/acrylonitrile copolymers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U009	(continued)		Organic synthesis to introd. cyanoethyl group
			Comonomer with styrene for urethane polyether polyols
			Chemical intermediate for adiponitrile & acrylamide
		Agricultural Chemicals	Fumigating stored tobacco
		Plastics	In plastics for appliances,automobile interior,boats,RV bodies,etc.
		Paper Manufacturing	Retention aids in papermaking & flotation processes
			Comonomer for barrier resins
		Petroleum	Mobility control agents in crude oil recovery
			Comonomer for acrylic acid
		Adhesive and Sealants	No information available
		Bottling	Bottles for soft drinks (use discontinued)
		Dyes and Pigments	Chemical intermediate dyes
		Textiles and Fibers	To improve the dye and working properties of acrylic fibers Comonomer for acrylic and modacrylic fibers Manufacture of blankets,draperies,upholstery,syn. furs,wigs In apparel,carpeting,home furnishing,sandbags,filter cloths,etc. Cyanoethylation of cotton
		Food Processing	Applied to milling,baking,food processing machinery
		Pesticide Manufacturing	In insecticides Pesticide fumigant for stored grain (former use)
		Pharmaceuticals	Chemical intermediate pharmaceuticals Chemical intermediate for glutethimide (sedative)
		Plastics and Resins	No information available
		Rubber	Manufacturing nitrile rubbers
U010	Mitomycin C	Medicine	Medication
U011	Amitrole	Agricultural Chemicals	Herbicide for non-crop uses (aquatics, hardwood nursery stock) Cotton defoliant Herbicide for food crops (former use) Plant growth regulator
		Photography	Reagent in photography
U012	Aniline		Chemical intermediate for substituted aniline salts

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U012	(continued)		Isocyanate synthesis
			Catalyst and stabilizer for hydrogen peroxide synthesis
			Chemical intermediate for 4-Anilinophenol
			Solvent
			Vulcanization accelerator
			Chemical intermediate for hydroquinone
			Cellulose as a precursor
		Plastics and Resins	Manufacture shoe blacks
			Azeotropic agent in manufact. of anhydrous hydrazine
			Chemical intermediate for methylenediisocyanate
			Manufacture isocyanates for urethane foam
		Explosives	Manufacture explosives
			Manufacture of teryl & optical whitening agents
			Chemical intermediate for corrosion inhibitors
		Agricultural Chemicals	Manufacture herbicides, fungicides
		Cosmetics/Fragrances	Manufacture perfumes
		Dyes and Pigments	Chemical intermediate for dyes & pigments In situ dyeing agent
		Photography	Manufacture photographic chemicals
		Food Processing	In synthesis of intermediates for artificial sweeteners
		Leather and Tanning	Component of skin stains
		Organic Chemicals	Manufacture of rigid polyurethanes
		Plastics and Resins Manufacturing	Component of lacquers & wood stains Chemical intermediate for specialty resins & cyclohexylamine Manufacture resins,varnishes Paint removers
		Paper Manufacturing	Analytical reagent in paper chemistry
		Pesticides Manufacturing	Chemical intermediate for pesticides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U012	(continued)	Petroleum Refining	No information available
		Pharmaceutical Manufacturing	Chemical intermediate for pharmaceuticals
		Printing	Printing inks,cloth marking inks
		Rubber	Chemical intermediate for rubber processing
U014	Auramine	Dyes and Pigments	Dye for lacquers,pen inks,carbon papers,typewriter ribbons Food dye in some countries Dye for paper,cardboard,textiles,leather,oils,waxes,alcoholic solvents Preparation of solvent yellow 34 Smoke dye
		Pharmaceuticals	Antiseptic
		Agricultural Chemicals	Fungicide
U015	Azaserine	Medicine	Research chemical
		Pharmaceuticals/Medicine	Antineoplastic agent, antibiotic, abortifacient, antifungal
U016	Benz(c)acridine	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U017	Benzal chloride	Specialty Chemical	Preparation of benzoyl chloride Manufacture of cinnamic acid Chemical intermediate for benzaldehyde
		Dyes and Pigments Manufacturing	In dyes
U018	Benz(a)anthracene	Chemical Research	No commercial use in U.S.
U019	Benzene	Organic Chemicals Manufacturing	Manufacture of styrenes, phenols, cyclohexanes
		Medicine	Manufacture of medicinal chemicals
		Dyes and Pigments	Manufacture of dyes
			Manufacture of artificial leather, linoleum, oil cloth

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U019	(continued)		Manufacture of airplane dopes
		Plastics and Resins	Manufacture of varnishes and lacquers Solvent for waxes, resins, oils, etc.
		Soap	Manufacture of detergents
		Pesticide	Manufacture of pesticides
U020	Benzenesulfonyl chloride	Specialty Chemical	Chemical intermediate for benzonitrile Chemical intermediate for thiophenol Chemical intermediate for glybuzole Chemical intermediate for benzene sulfonamides Chemical intermediate for N-2-chloroethyl amides
		Pesticide	Esters formerly used as insecticides,miticides,fenson acaricide
		Laboratory	Reagent for Freiedl-Crafts sulfonulation
U021	Benzidine	Food	Reagent for hydrogen peroxide in milk
		Paper	Production of security paper
		Sugar	Spray reagent for sugars
		Medicine	Used to verify TLC bands attributed to blood (former use) Stain in microscopy
		Laboratory	Lab agent to detect cyanide & sulfate Quantitative determination of nicotine
		Specialty Chemical	Organic synthesis
		Printing	Used in security printing
			Liquification meadurement
		Plastics	Manufacture of plastic films
		Dyes and Pigments	Chemical intermediate for AZO dyes
		Rubber	Stiffening agent in rubber compounding
U022	Benzo(a)pyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U022	(continued)		Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Positive control for mutagenicity and carcinogenicity studies
U024	Bis(2-chloroethoxy)methane		Solvent
		Rubber	Chemical intermediate for polysulfide rubber
U025	Dichloroethyl ether	Petroleum Refining	Scavenge lead deposits in gasoline
			Purification of oils
		Agricultural Chemicals	Soil fumigant (former use) Control earworms on corn (former use)
		Organic Chemicals	Chemical intermediate & cross-linker
		Pesticides	Acaricide (former use)
		Pharmaceuticals	Anesthetic
		Textiles	Scouring of textiles
			Used in aerosols
		Lubricant	General/selective solvent production lubricating oils
			In Kier boiling
U026	Chloronaphazine	Medicine	Antineoplastic agent (not in U.S.)
U027	bis-(2-chloroeisopropyl)ether		Chemical intermediate
			In paint and varnish removers
			Spotting and cleaning solutions
			Solvent for fats, waxes, grease
		Textiles	Textile processing
U029	Methyl bromide	Food	Food sterilization Extraction of oils from nuts, seeds, flowers
			Fire extinquisher
			Refrigerant
			In ionization chambers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U029	(continued)		Degreasing wool
		Agricultural Chemicals	Fumigant for soil
		Dyes and Pigments	Solvent in aniline dyes
		Pesticides	Insect and rodent control in space and commodity fumigations
		Pharmaceuticals	Methylating agent
U030	4-Bromophenyl phenyl ether	Chemical Research	Not in U.S.
U031	n-Butyl alcohol	Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
		Veterinary Medicine	Bactericide
		Furniture Manufacturing	Solvent for surface coatings
		Organic Chemical Manufacturing	Chemical intermediate for ethylene glycol, monobutyl ethers, glycol ethers, plasticizers, n-butyl acetate, n-butyl acrylate, butylamines, 2,4-D esters
			Dehydrating agent
			Solvent for vegetable oils and alkaloids
U033	Carbon fluoride	Petroleum	Chemical intermediate in organic synthesis
U034	Trichloroacetaldehyde		Induce swelling of starch granules
			Spraying and pouring of polyurethanes
			Chemical intermediate for chloral hydrate
			Chemical intermediate for herbicide trichloroacetic acid
		Pesticides	Intermediate in manufacture of DDT,methoxychlor,DDVP,naled,trichlorofon
U035	Chlorambucil		Not produced in U.S. (imported from U.K.)
		Medicine	Antineoplastic agent: leukemia,Hodgkins disease,malignant lymphomas,etc.
		Veterinary Medicine	Antineoplastic agent
U036	Chlordane	Pesticide	Insecticide
U037	Chlorobenzene	Pesticide	Manufacture of insecticide
U038	Chlorobenzilate	Pesticide	Acaricide
U039	p-Chloro-m-cresol		External germicide

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U041	n-Chloro-2,3-epoxypropane		Scavenging additive to trichloroethylene
			Preparation of condensates with polyfunctional substances
			Chemical intermediate for glycidyl acrylate and glycidyl methacrylate
			Polymer coating materials in water supply systems
		Plastics and Resins	Reactive plasticizer
			Comonomer for unmodified epoxy resins
			Preparation of ion exchange resins,elastomers,solvents,plasticizers
			Solvent for natural & synthetic resins,gums,cellulose esters & ethers
			Solvent for lacquers,cement for celluloid
			Solvent for paints,varnishes,nail enamels
			Comonomer for polyamide-epichlorohydrin resins
			Raw material for epoxy & phenoxy resins
			Heat stabilizer for plastics
		Paper Manufacturing	High wet-strength resins for paper industry
			Chemical intermediate for polythiols
			Cross-linking agent for hydrogel sheet for temporary wound dressing
			Stabilizer in chlorine-containing material
			Intermediate in the production of beta-blocker, aryloxypropanolamine
			Hair products
			In formation of polythioaldane carboxylic acid oligomers in hair shampoo
			Cross-linking agent for cyclodextrins
			Production of poly(oxlyalkylene)ether derivatives
			Co-stabilizer to enhance mixed-metal combination
			Cross-linking agent in microencapsulation
			Chemical intermediate for alkyl glyceryl ether sulfonate surfactants
			Raw material for glycerol and glycidol derivatives
			Chemical intermediate for glycidyl ethers,glycerin
			Monomer or comonomer in epichlorohydrin elastomers
		Agricultural Chemicals	Sporicide
		Optics	Chemical intermediate for quaternary ammonium salts

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U029	(continued)		Degreasing wool
		Agricultural Chemicals	Fumigant for soil
		Dyes and Pigments	Solvent in aniline dyes
		Pesticides	Insect and rodent control in space and commodity fumigations
		Pharmaceuticals	Methylating agent
U030	4-Bromophenyl phenyl ether	Chemical Research	Not in U.S.
U031	n-Butyl alcohol	Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
		Veterinary Medicine	Bactericide
		Furniture Manufacturing	Solvent for surface coatings
		Organic Chemical Manufacturing	Chemical intermediate for ethylene glycol, monobutyl ethers, glycol ethers, plasticizers, n-butyl acetate, n-butyl acrylate, butylamines, 2,4-D esters
			Dehydrating agent
			Solvent for vegetable oils and alkaloids
U033	Carbon fluoride	Petroleum	Chemical intermediate in organic synthesis
U034	Trichloroacetaldehyde		Induce swelling of starch granules
			Spraying and pouring of polyurethanes
			Chemical intermediate for chloral hydrate
			Chemical intermediate for herbicide trichloroacetic acid
		Pesticides	Intermediate in manufacture of DDT,methoxychlor,DDVP,naled,trichlorofon
U035	Chlorambucil		Not produced in U.S. (imported from U.K.)
		Medicine	Antineoplastic agent: leukemia,Hodgkins disease,malignant lymphomas,etc.
		Veterinary Medicine	Antineoplastic agent
U036	Chlordane	Pesticide	Insecticide
U037	Chlorobenzene	Pesticide	Manufacture of insecticide
U038	Chlorobenzilate	Pesticide	Acaricide
U039	p-Chloro-m-cresol		External germicide

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U041	(continued)	Pesticides	Insect fumigant Stable insecticide emulsion
		Pharmaceuticals	Manufacture of pharmaceuticals
		Rubber	Curing propylene-based rubbers
U042	2-Chloroethyl vinyl ether	Fibers	Copolymer with ethyl acrylate to produce acrylic elastomer
		Pharmaceuticals	Chemical intermediate for anesthetics, sedatives, & cellulose ethers
U043	Vinyl chloride	Plastics	Monomer/comonomer for polyvinyl chloride
		Textiles and Fibers	Monomer and comonomer for fibers
			Chemical intermediate
		Adhesive and Sealants Industry	Plastic adhesive
		Automobile Manufacturing	No information available
		Building and Construction	Production vinyl asbestos floor tiles
		Electrical Equipment	Insulation for electrical wire,cable,piping
		Glass	No information available
		Packaging	Food, medical supplies
		Paper	No information available
		Plastics	Organic synthesis of plastics
		Rubber	No information available
U044	Chloroform		Solvent for fats, oils, rubber, alkaloids, waxes, resins
			Cleaning agent
			Fire extinquishers
U045	Chloromethane	Rubber	Manufacturing of methyl cellulose
			Manufacturing of tetramethylead
			Methylating agent
			Propellant
		Agricultural Chemicals	Herbicide Manufacturing of fumigants

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U045	(continued)	Pharmaceuticals	Anesthetic
		Plastics	Foaming agent
		Rubber	Manufacturing of synthetic rubbers Solvent and diluent in butyl rubber production Production of silicone resins and rubbers
		Steel	Foaming agent stainless steel
		Timber	Processing of timber products
			Extractant for oils, fats and resins
			Fluid for thermometric & thermostatic equipment
			Chemical intermediate
			Terminates polymerization of bakelite polysulfone
U046	Chloromethyl methyl ether		Industrial polymers
			Alkylating agent & solvent in manufacture of water repellants
			Intermediate in synthesis of chloromethylated compound
			Preparation of ion-exchange resins
			Chemical intermediate for dodecylbenzyl chloride
U047	2-Chloronaphthalene		No information available
U048	2-Chlorophenol		No information available
U049	4-Chloro-o-toluidine hydrochloride	Dyes and Pigments	Produce AZO dyes for cotton,silk,acetate,nylon Chemical intermediate for dyes
U050	Chrysene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U051	Creosote	Medicine	Antipyretic, styptic, astringent

APPENDIX C

PROBLEMS ENCOUNTERED IN TREATMENT STANDARD CALCULATIONS PRECLUDING PROMULGATION OF NUMERICAL STANDARDS

APPENDIX C

PROBLEMS ENCOUNTERED IN TREATMENT STANDARD CALCULATIONS PRECLUDING PROMULGATION OF CONCENTRATION-BASED STANDARDS

Treatment standards for the majority of wastewater forms of the U and P wastes covered volumes A, B, and C were calculated based on the wastewater treatment database compiled by the Agency for establishing standards for multi-source leachate (F039) (See Background Document for U and P wastes and Multi-Source Leachates, Volume A). Wastewater treatment performance data were not available for the constituent of concern in U0 91 (3,3'-Dimethoxybenzidine) and U095 (3,3'-Dimethylbenzidine). Therefore, concentration-based standards could not be calculated and a method of treatment was established for the wastewater forms of these waste codes.

Treatment standards for the majority of nonwastewater forms of the U and P wastes covered in volumes A, B, and C were calculated based on data compiled from the BDAT incineration database for incinerator ash residuals. (See the Background Document for U and P Wastes and Multi-Source Leachates, Volume C.) Specifically, the Agency considered treatment performance data from the 14 incineration tests conducted under the BDAT program (see Table 4-1). Nonwastewater treatment standards for waste constituents selected for regulation were calculated by multiplying the constituent detection limit in ash by an accuracy correction factor and by a variability factor. These three components of the treatment standard calculation are discussed below.

C.1 Detection Limits

U and P waste constituent detection limits for the ash residuals were used to calculate treatment standards for nonwastewater forms of the U and P wastes. In cases where the waste constituent was detected in the untreated waste from more than one incineration test, the treatment standard was based on the highest detection limit for that constituent in the ash residual. For waste constituents not detected in any of the 14 tests, the highest detection limit reported for that constituent in the ash residual from the 14 treatment tests was used.

C.2 Accuracy Correction Factors

The detection limits used to calculate treatment standards were corrected to account for analytical interferences associated with the sample matrices. To do this, the Agency used the matrix spike recovery data from that same test from which the detection limits were taken. Detection limits were corrected for accuracy as follows:

1. A matrix spike recovery was determined for each waste constituent. In cases where a matrix spike recovery was not performed for a waste constituent from the treatment test for which the detection limit was used, the matrix spike recovery for a similar constituent from that treatment test was transferred to that constituent.
2. An accuracy correction factor was calculated by dividing 100 by the matrix spike recovery (percent) for that constituent.
3. Detection limits for each waste constituent were corrected by multiplying the detection limit for each constituent by its corresponding accuracy correction factor.

C.3 Variability Factors

The variability factor accounts for the variability inherent in treatment system performance, treatment residual collection, and analysis of the treated waste samples. If a constituent was present above the detection limit in the ash from the test from which the detection limit was transferred, a variability factor was calculated using the data from that test. Variability factors could not be calculated for waste constituents that were not detected in the incinerator ash residuals. In these cases, a variability factor of 2.8 was used to account for this inherent variability. The variability factor calculation is described in EPA's Methodology for Developing BDAT Treatment Standards (Reference 1).

C.4 U and P Waste Constituents Amenable to Quantification Having Method of Treatment Set as BDAT Treatment Standard

Four U and P waste constituents are amenable to analytical quantification, yet methods of treatment have been established as the BDAT treatment standard. These constituents are:

- P003 Acrolein;
- U042 2-Chloroethyl vinyl ether;
- U091 3,3'-Dimethoxybenzidine; and
- U095 3-3'-Dimethylbenzidine.

Using the treatment standard calculation methodology described above, the standards that were calculated for these waste codes ranged from 970 ppm - 2,400 ppm. The Agency does not believe that treatment standards of this magnitude are representative of substantial treatment for these organic constituents. In addition, the constituent detection limits ranged over five to six orders of magnitude, with none determined to be outliers. The detection limit ranges for these constituents are shown below:

U and P Wastes	Detection Limit Range
- Acrolein	0.01 - 500 ppm
- 2-Chloroethyl vinyl ether	0.01 - 200 ppm
- 3,3'-Dimethoxybenzidine	0.42 - 500 ppm
- 3,3'-Dimethylbenzidine	0.55 - 500 ppm

This broad range of detection limits suggests that analyses for these constituents are difficult in incinerator ash matrices due to matrix interferences.

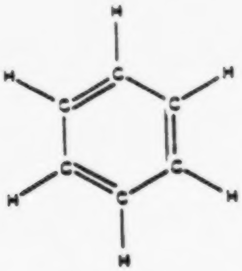
Based on the above discussion, the Agency is specifying methods of treatment as the treatment standards for these waste codes. The determination of treatment standards for these waste codes is discussed further in Section 4.0 of this document.

Appendix B

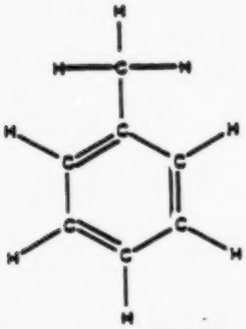
U AND P CONSTITUENT CHEMICAL STRUCTURES

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

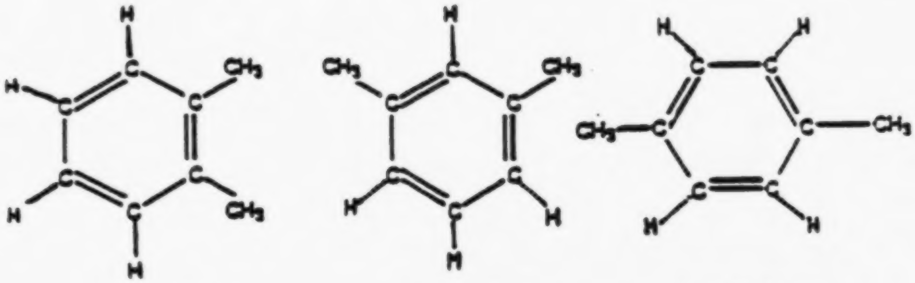
AROMATICS AND OTHER HYDROCARBON WASTES (ANALYZABLE)



U019: Benzene



U220: Toluene (methylbenzene)

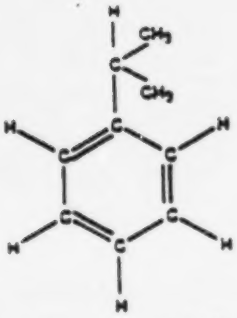


o-Xylene **m-Xylene** **para-Xylene**

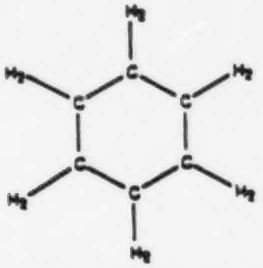
U239: Xylene(s)
ortho-Xylene, meta-Xylene and para-Xylene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

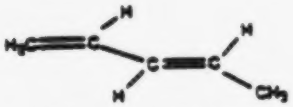
AROMATICS AND OTHER HYDROCARBON WASTES (NONANALYZABLE)



U055: Cumene (Isopropylbenzene)



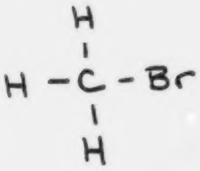
U056: Cyclohexane



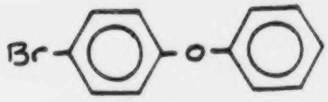
$CH_3CH=CHCH=CH_2$
U186: 1,3- PENTADIENE

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

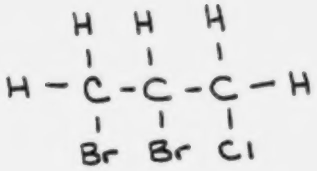
BROMINATED ORGANIC WASTES
(ANALYZABLE)



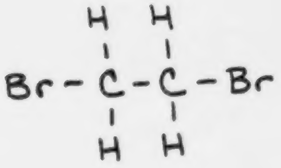
U029 methyl bromide



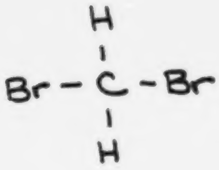
U030 4-Bromophenyl phenylether



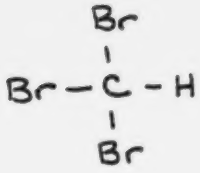
U066 1,2-Dibromo-3-chloropropane



U067 1,2-Dibromoethane
(Ethylene dibromide)



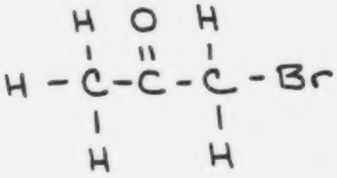
U068 Dibromomethane



U225 Bromoform

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

BROMINATED ORGANIC WASTES
(NONANALYZABLE)

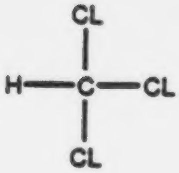


$$\mathrm{H-\overset{H}{\underset{H}{C}}-\overset{O}{\overset{\|}{C}}-\overset{H}{\underset{H}{C}}-Br}$$

P017 Bromoacetone

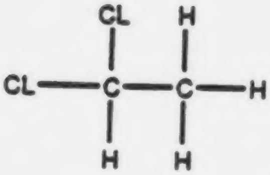
CHEMICAL STRUCTURES FOR U AND P WASTE CODES

HALOGENATED ALIPHATIC WASTES
(ANALYZABLE)



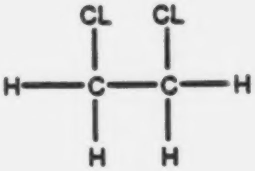
$H-\overset{CL}{\underset{CL}{C}}-CL$

U044: Chloroform



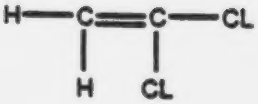
$CL-\overset{CL}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-H$

U076: 1,1-Dichloroethane



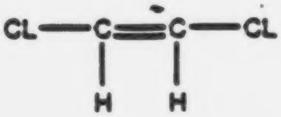
$H-\overset{CL}{\underset{H}{C}}-\overset{CL}{\underset{H}{C}}-H$

U077: 1,2-Dichloroethane



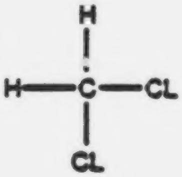
$H-\underset{H}{C}=\underset{CL}{C}-CL$

U078: 1,1-Dichloroethylene



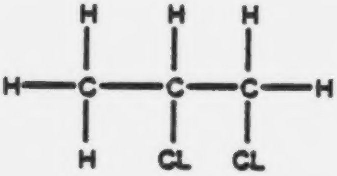
$CL-\underset{H}{C}=\underset{H}{C}-CL$

U079: 1,2-Dichloroethylene



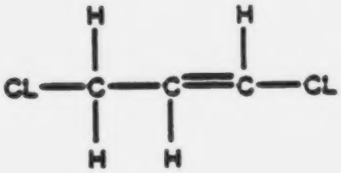
$H-\overset{H}{\underset{CL}{C}}-CL$

U080: Methylene Chloride



$H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{CL}{C}}-\overset{H}{\underset{CL}{C}}-H$

U083: 1,2-Dichloropropane

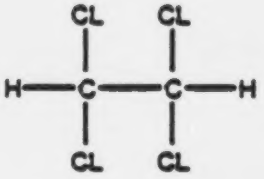


$CL-\overset{H}{\underset{H}{C}}-\underset{H}{C}=\overset{H}{C}-CL$

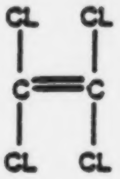
U084: 1,3-Dichloropropene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

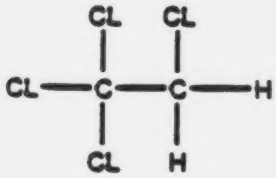
HALOGENATED ALIPHATIC WASTES (ANALYZABLE) (Continued)



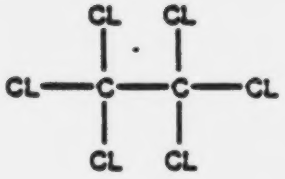
U209: 1,1,2,2-Tetrachloroethane



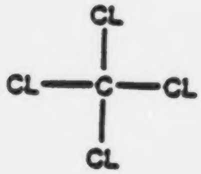
U210: Tetrachloroethylene



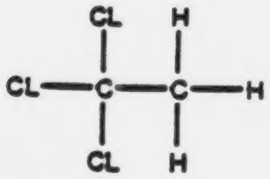
U208: 1,1,1,2-Tetrachloroethane



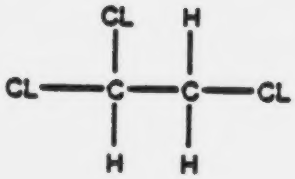
U131: Hexachloroethane



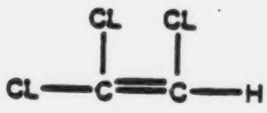
U211: Carbon Tetrachleride



U226: 1,1,1-Trichloroethane



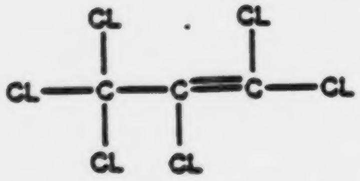
U227: 1,1,2-Trichloroethane



U228: Trichloroethylene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

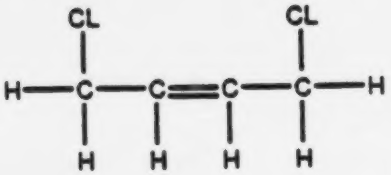
HALOGENATED ALIPHATIC WASTES
(ANALYZABLE) (Continued)


CL
CL
CL
C
C
C
CL
CL
CL

U243: Hexachloropropene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

HALOGENATED ALIPHATIC WASTES
(NONANALYZABLE)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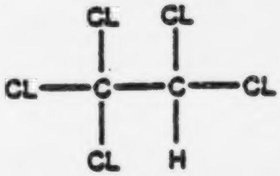
C
C
C
C
H
H
H
H
H

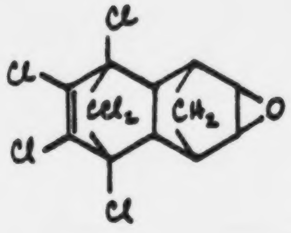
U074: 1,4-Dichloro-2-Butene


CL
CL
CL
C
C
CL
CL
H

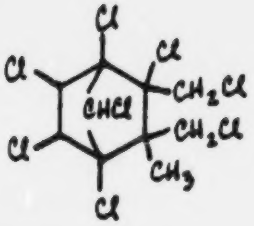
U184: Pentachloroethane

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

HALOGENATED PESTICIDES AND CHLOROBENZENES (ANALYZABLE)


Cl
Cl
CCl_2
CH_2
O
Cl
Cl

P037 Dieldrin } (stereoisomers)
P051 Endrin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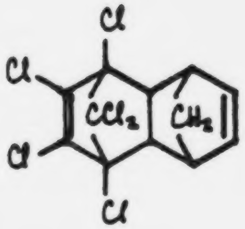
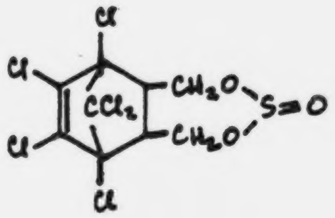
Cl
Cl
CHCl
CH_2Cl
CH_2Cl
Cl
CH_3
Cl

P123 Toxaphene


Cl
Cl
CCl_2
CH_2
Cl
Cl

P004 Aldrin } (stereoisomers)
P060 Isodrin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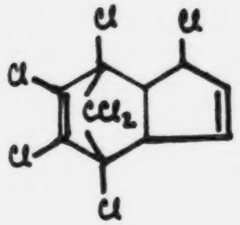
Cl
CCl_2
CH_2O
S=O
CH_2O
Cl
Cl

P050 Endosulfan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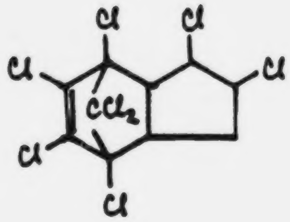
CCl_2
Cl
Cl

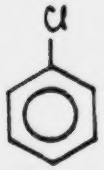
P059 Heptachlor


Cl
Cl
Cl
Cl
CCl_2
Cl
Cl

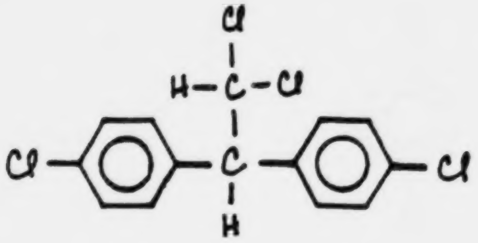
U036 Chlordane

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

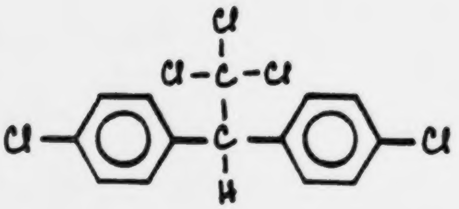
HALOGENATED PESTICIDES AND CHLOROBENZENES (ANALYZABLE) (Continued)



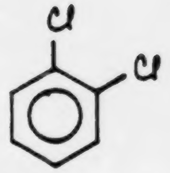
U037 Chlorobenzene



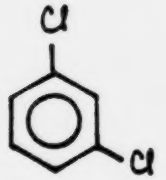
U060 Dichlorodiphenyldichloroethane; DDD



U061 Dichlorodiphenyltrichloroethane; DDT



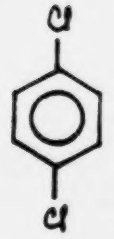
U070 1,2-Dichlorobenzene



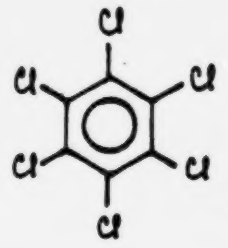
U071 1,3-Dichlorobenzene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

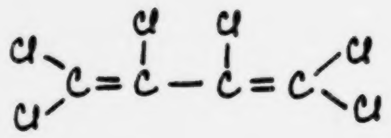
HALOGENATED PESTICIDES AND CHLOROBENZENES (ANALYZABLE) (Continued)



U072 1,4-Dichlorobenzene


Cl
Cl
Cl
Cl
Cl
Cl

U127 Hexachlorobenzene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C
C
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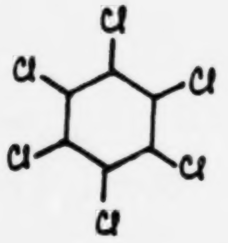
C
Cl
Cl

U128 Hexachlorobutadiene


Cl
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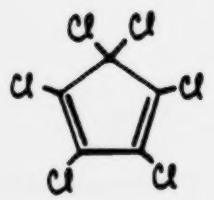
Cl
Cl

U129 gamma-BHC (Lindane)


Cl
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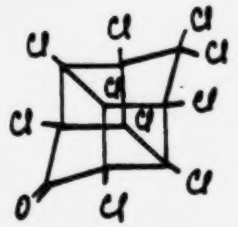
Cl
Cl

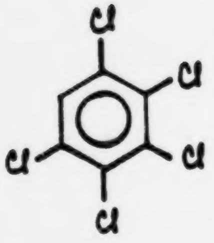
U130 Hexachlorocyclopentadiene


Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
O

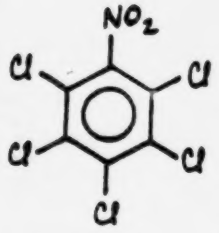
U142 Kepone

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

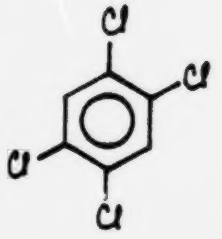
HALOGENATED PESTICIDES AND CHLOROBENZENES (ANALYZABLE) (Continued)


Cl
Cl
Cl
Cl
Cl

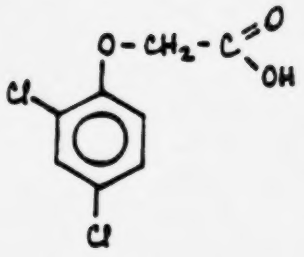
U183 Pentachlorobenzene


NO₂
Cl
Cl
Cl
Cl
Cl

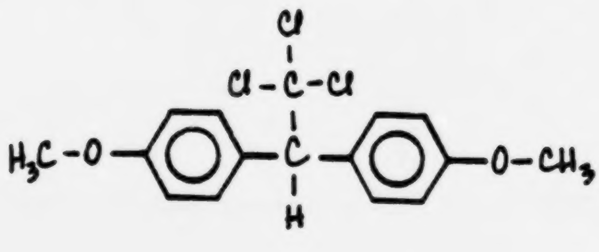
U185 Pentachloronitrobenzene



U207 1,2,4,5-Tetrachlorobenzene


O - CH₂ - C
O
OH
Cl
Cl

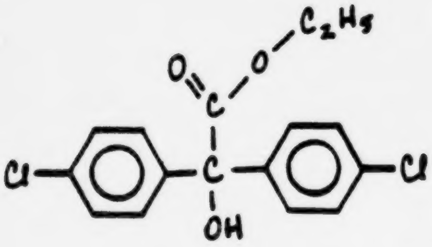
U240 2,4-Dichlorophenoxyacetic acid; 2,4-D


Cl
Cl - C - Cl
H₃C - O
C
O - CH₃
H

U247 Methoxychlor

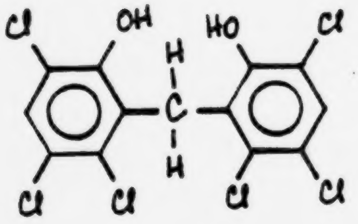
CHEMICAL STRUCTURES FOR U AND P WASTE CODES

HALOGENATED PESTICIDES AND CHLOROBENZENES (NONANALYZABLE)



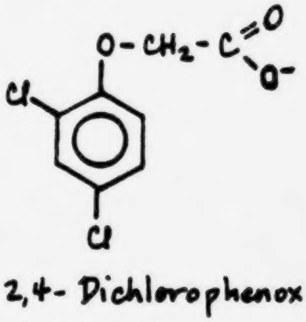
C_2H_5
O
O
C
Cl
C
Cl
OH

U038 Chlorobenzilate



Cl
OH
HO
Cl
H
C
H
Cl
Cl
Cl
Cl

U132 Hexachlorophene

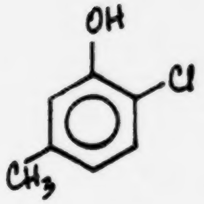


O-CH_2-C
O
O⁻
Cl
Cl

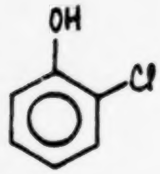
U240 2,4-Dichlorophenoxyacetic salts (and esters)

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

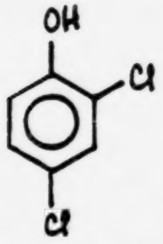
HALOGENATED PHENOLIC WASTES
(ANALYZABLE)



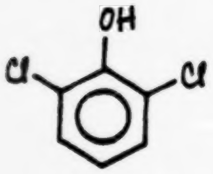
U039 p-Chloro-m-cresol



U048 2-Chlorophenol



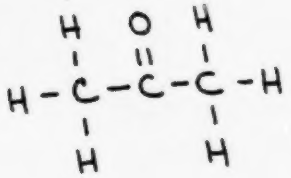
U081 2,4-Dichlorophenol



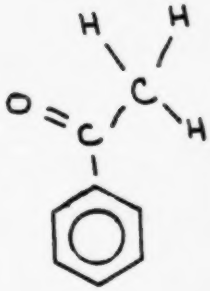
U082 2,6-Dichlorophenol

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

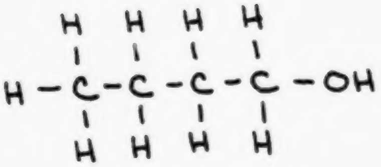
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES
(ANALYZABLE)



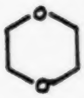
U002 Acetone



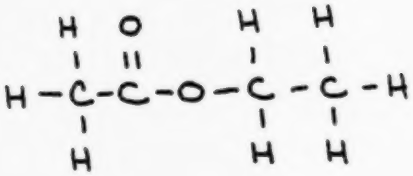
U004 Acetophenone



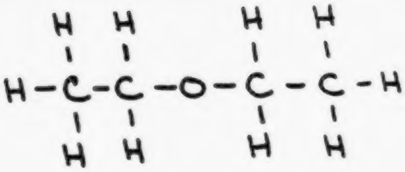
U031 n-Butyl alcohol



U108 1,4-Dioxane



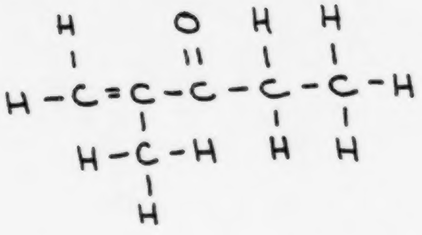
U112 Ethyl acetate



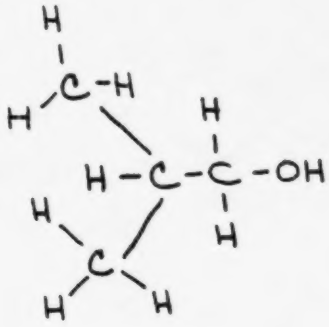
U117 Ethyl ether

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

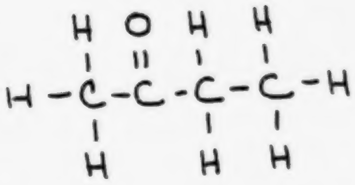
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES (ANALYZABLE) (Continued)



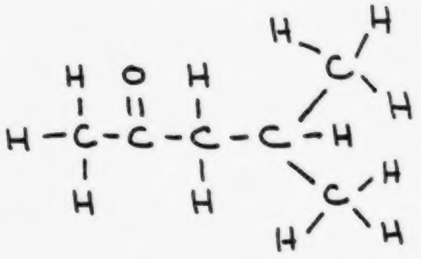
U118 Ethyl methacrylate



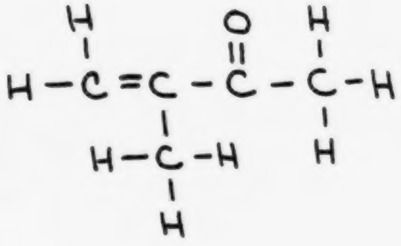
U140 Isobutyl alcohol



U159 methyl ethyl ketone



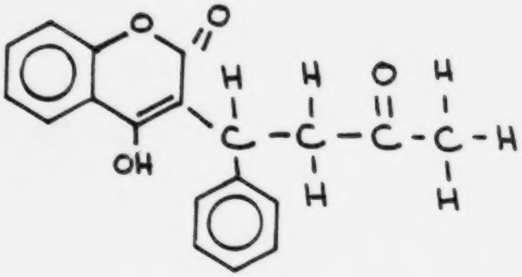
U161 methyl isobutyl ketone (isopropylacetone)



U162 Methyl methacrylate

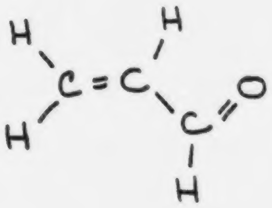
CHEMICAL STRUCTURES FOR U AND P WASTE CODES

OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES (NONANALYZABLE)

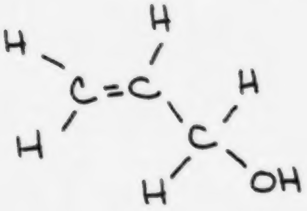


P001 Warfarin (>0.3%)

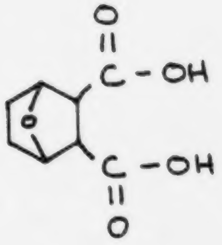
U248 Warfarin (≤ 0.3%)



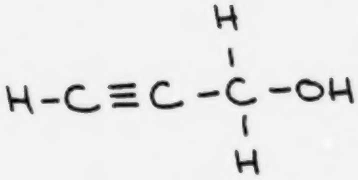
P003 Acrolein



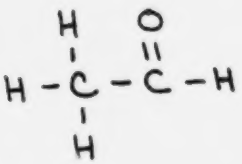
P005 allyl alcohol



P088 Endothall



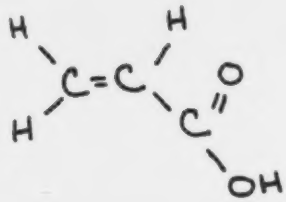
P102 Propargyl alcohol



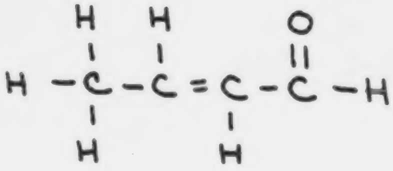
U001 Acetaldehyde

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

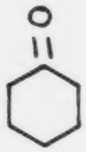
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES (NONANALYZABLE) (Continued)



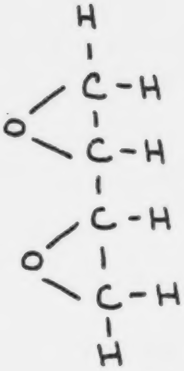
U008 Acrylic acid



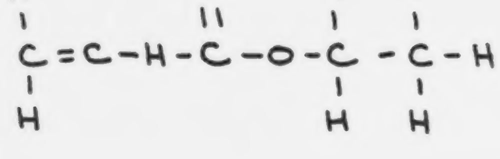
U053 Crotonaldehyde



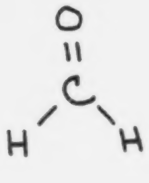
U057 Cyclohexanone



U085 1,2:3,4-Diepoxybutane (erythritol anhydride)



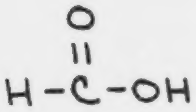
U113 Ethyl acrylate



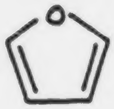
U122 Formaldehyde

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

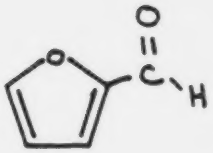
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES (NONANALYZABLE) (Continued)



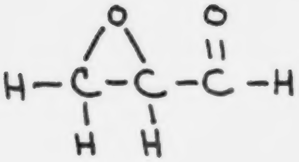
U123 Formic acid



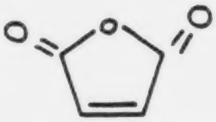
U124 Furan



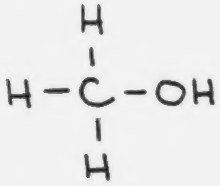
U125 Furfural



U126 Glycidylaldehyde



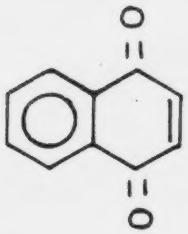
U147 maleic anhydride



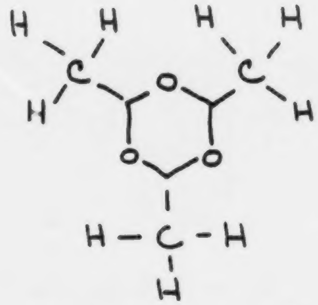
U154 Methanol

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

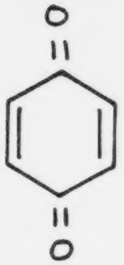
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES (NONANALYZABLE) (Continued)



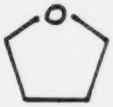
U166 1,4-Naphthoquinone



U182 Paraldehyde



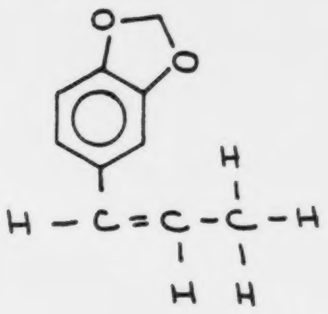
U197 p-Benzoquinone
(quinone)



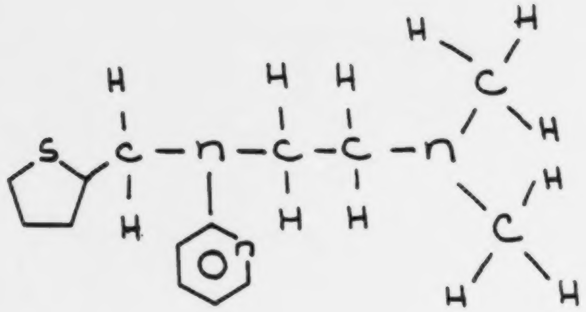
U213 Tetrahydrofuran

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

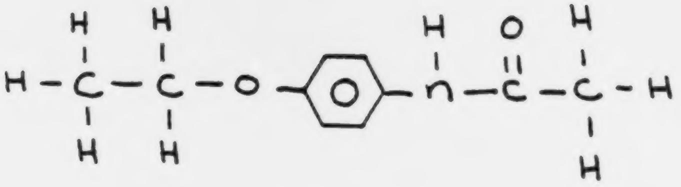
WASTES OF A PHARMACEUTICAL NATURE
(ANALYZABLE)



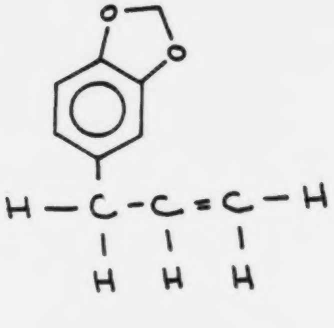
U141 Isosafrole



U155 methapyrilene



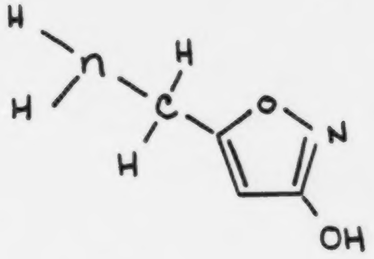
U187 Phenacetin



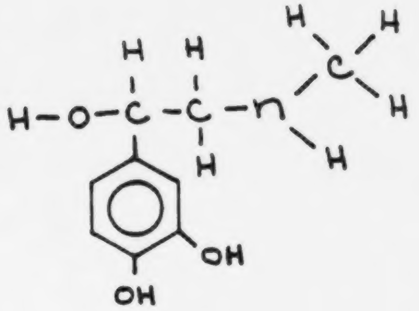
U203 Safrole

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

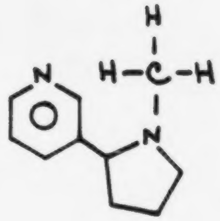
WASTES OF A PHARMACEUTICAL NATURE
(NONANALYZABLE)



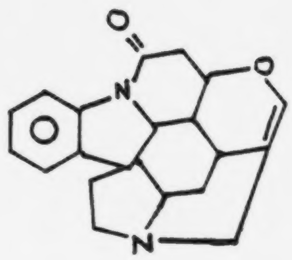
P007 5-aminomethyl-3-isoxazolol



P042 Epinephrine



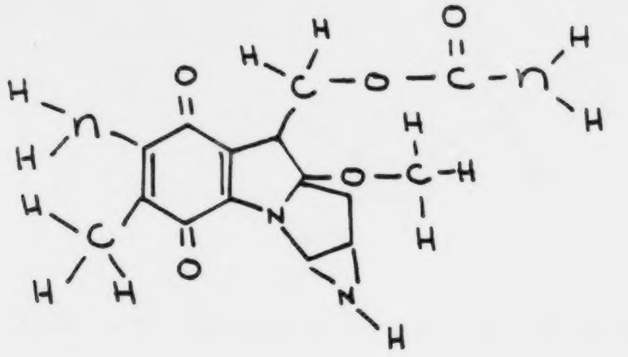
P075 Nicotine and Salts



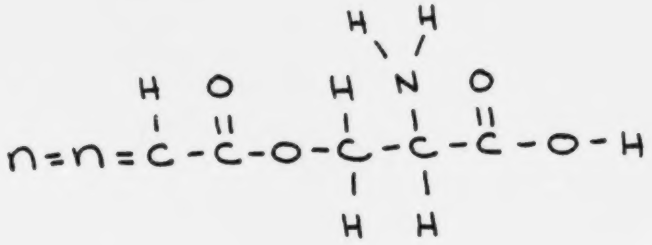
P108 Styrchnine and Salts

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

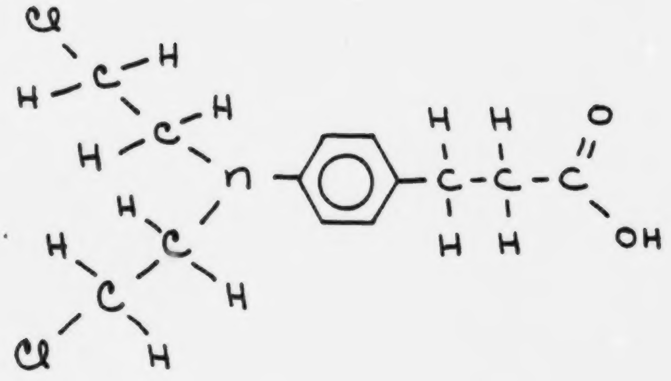
WASTES OF A PHARMACEUTICAL NATURE (NONANALYZABLE) (Continued)



U010 mitomycin C

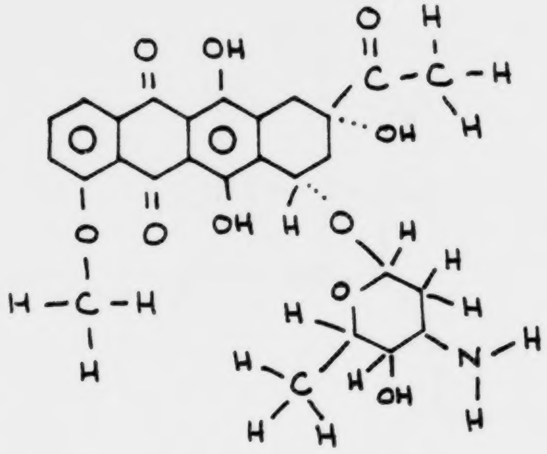


U015 azaserine

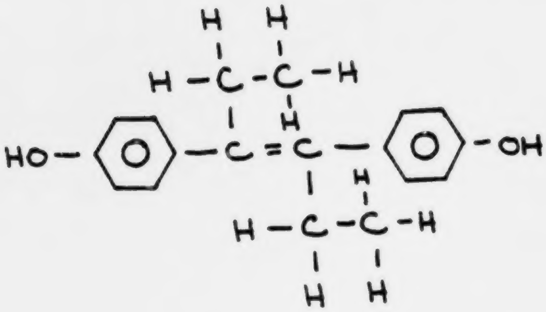


U035 Chlorambucil

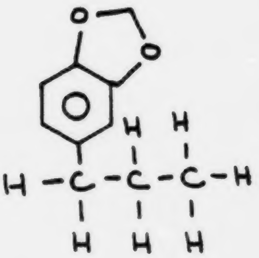
WASTES OF A PHARMACEUTICAL NATURE (NONANALYZABLE) (Continued)



U059 Daunomycin



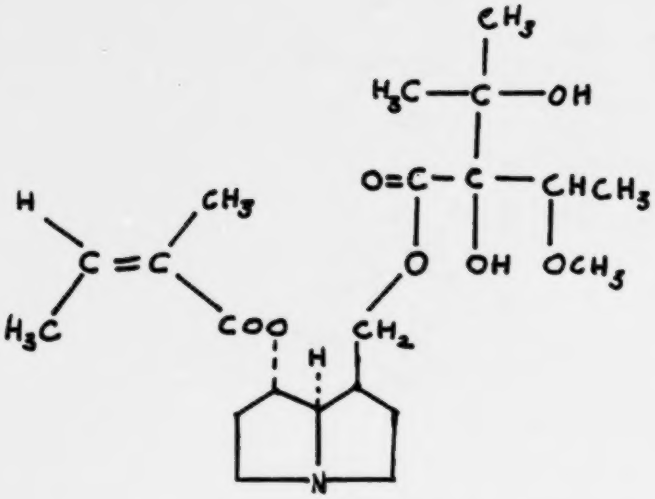
U089 Diethylstilbestrol



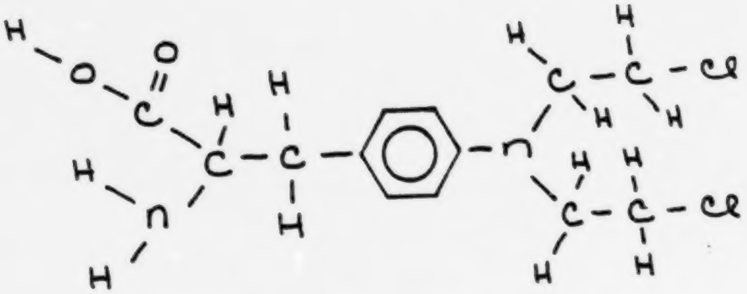
U090 Dihydrosafrole

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

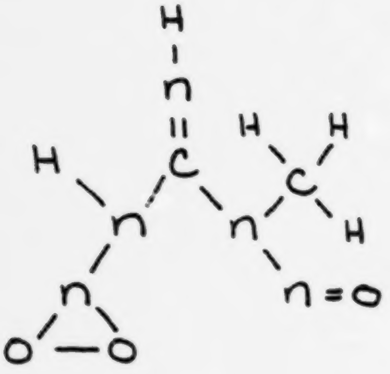
WASTES OF A PHARMACEUTICAL NATURE (NONANALYZABLE) (Continued)



U143 Lasiocarpine



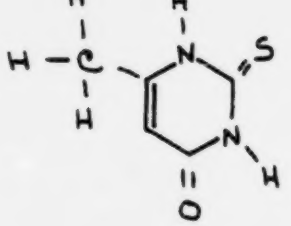
U150 melphalan



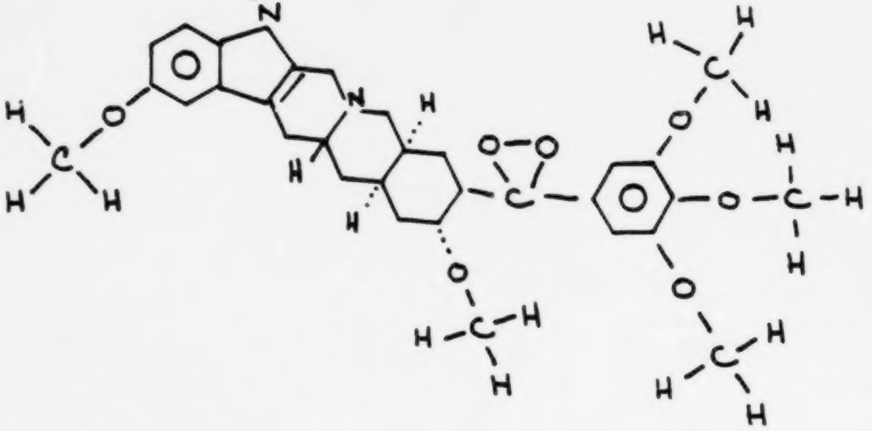
U163 n-methyl-, n-nitro-, n-nitrosoguanidine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

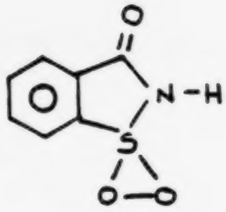
WASTES OF A PHARMACEUTICAL NATURE (NONANALYZABLE) (Continued)



U164 Methylthiouracil



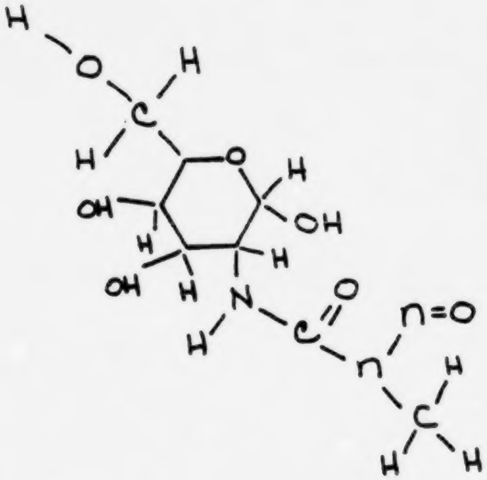
U200 Resperpine



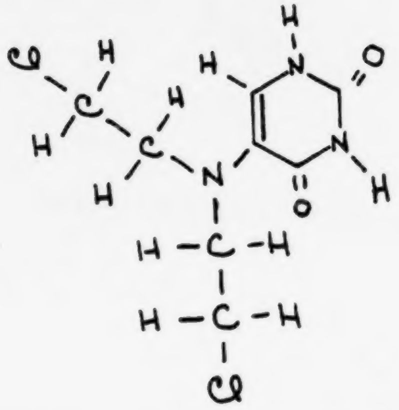
U202 Saccharin (and Salts)

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

WASTES OF A PHARMACEUTICAL NATURE (NONANALYZABLE) (Continued)



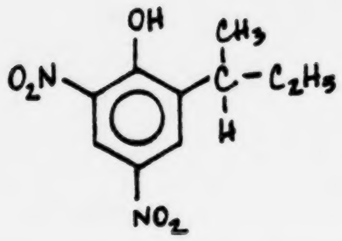
U206 Streptozotocin



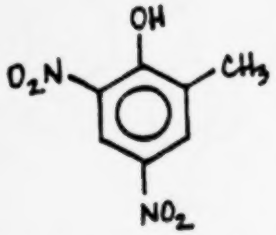
U237 Uracil mustard

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

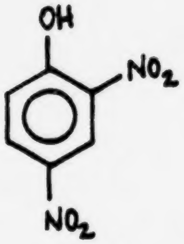
PHENOLICS
(ANALYZABLE)


OH
CH3
O2N
C
C2H5
H
NO2

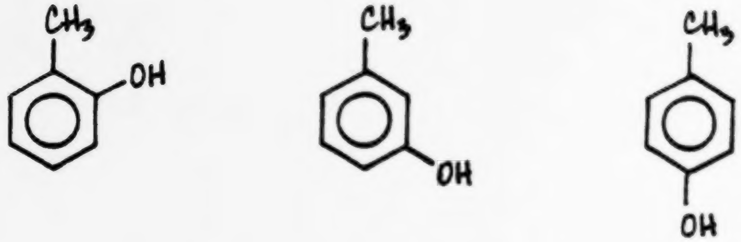
P020 2-sec-Butyl-4,6-dinitrophenol
(Dinoseb)


OH
O2N
CH3
NO2

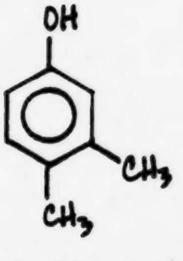
P047 4,6-Dinitro-o-cresol



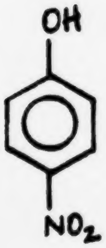
P048 2,4-Dinitrophenol


CH3
OH
CH3
OH
CH3
OH

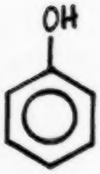
U052 Cresols (o-, m-, and p- isomers)



U101 2,4-Dimethylphenol



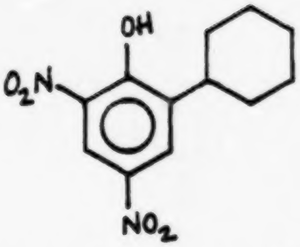
U170 4-Nitrophenol



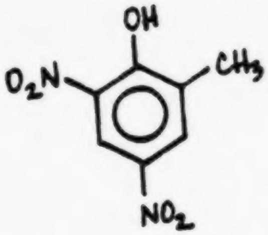
U188 Phenol

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

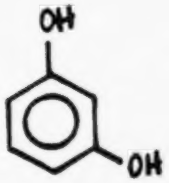
PHENOLICS
(NONANALYZABLE)



P034 2-Cyclohexyl-4,6-dinitrophenol



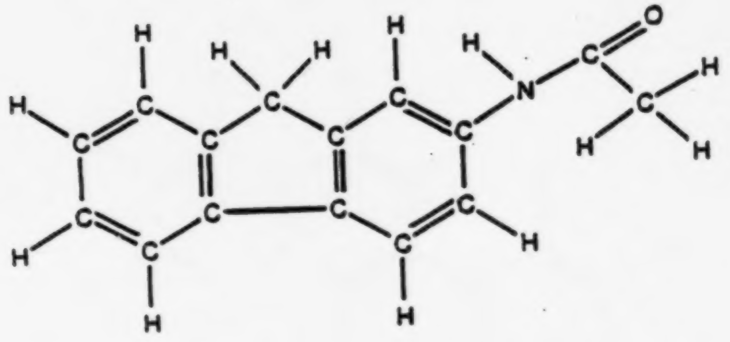
P047 4,6-Dinitro-o-cresol salts



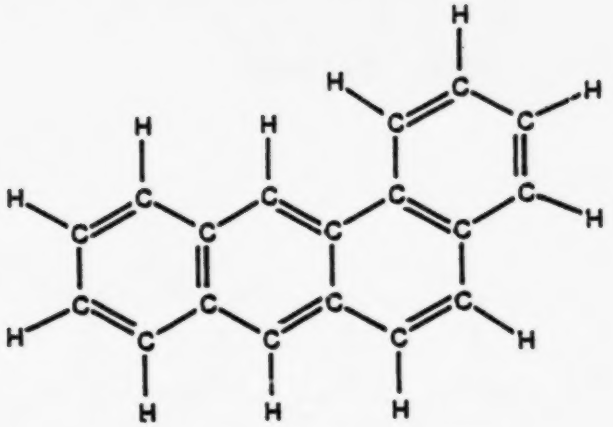
U201 Resorcinol

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

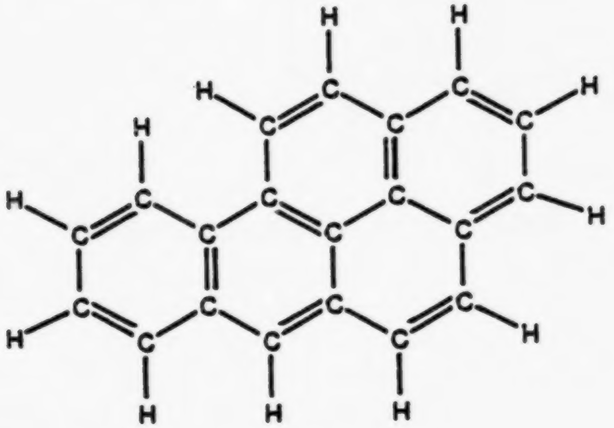
POLYNUCLEAR AROMATIC WASTES
(ANALYZABLE)



U005: 2-Acetylaminofluorene

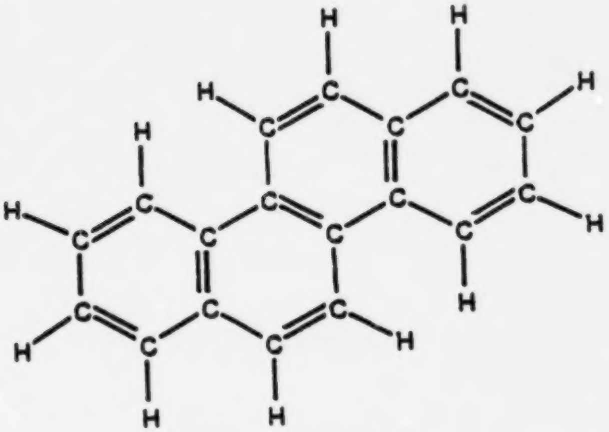


U018: Benz(a)Anthracene

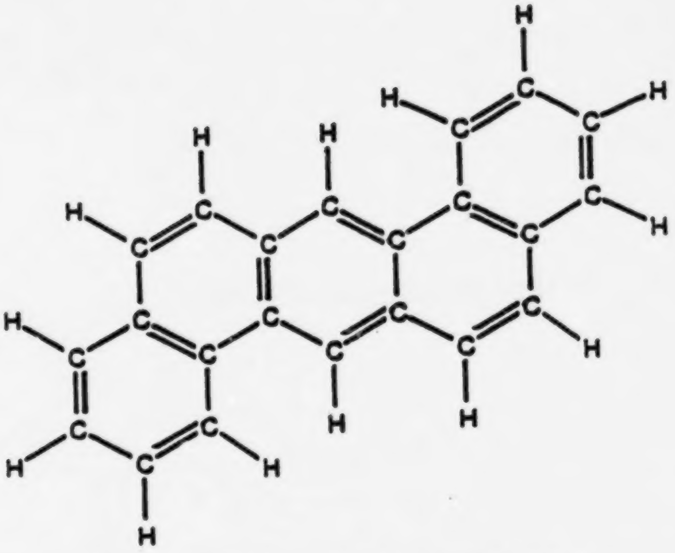


U022: Benzo(a)pyrene

POLYNUCLEAR AROMATIC WASTES (ANALYZABLE) (Continued)

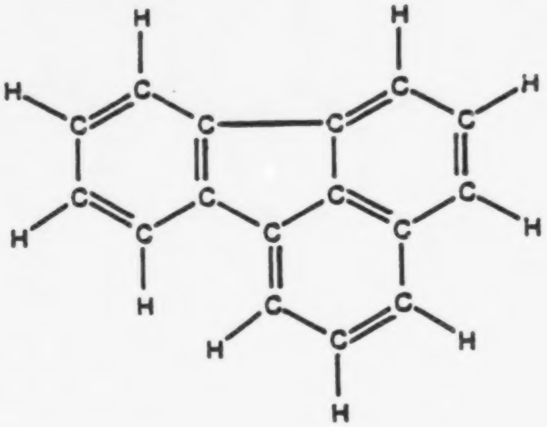


U050: Chrysene

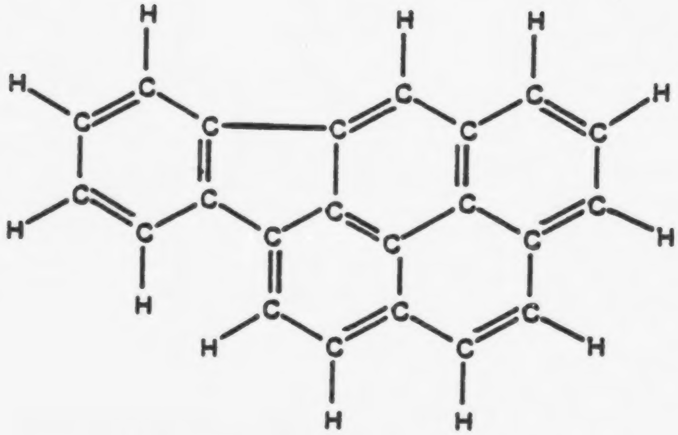


U063: Dibenzo(a,h) Anthracene

POLYNUCLEAR AROMATIC WASTES
(ANALYZABLE) (Continued)



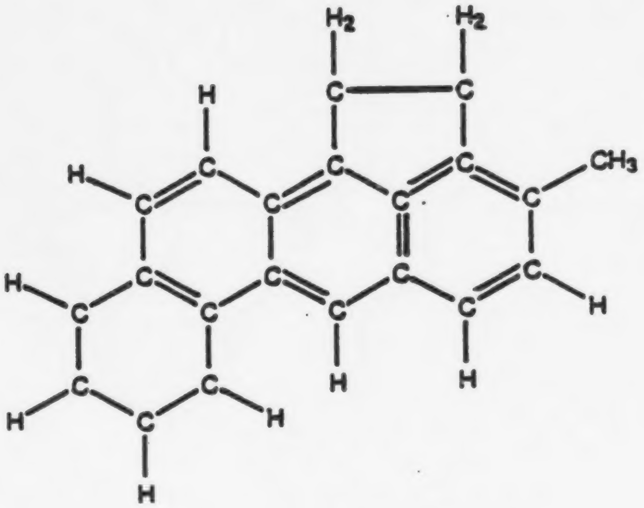
U120: Fluoranthene



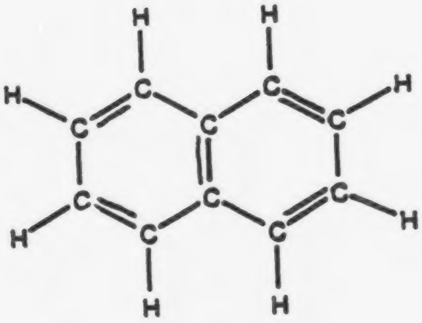
U137: Indeno(1,2,3-c,d)pyrene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

POLYNUCLEAR AROMATIC WASTES
(ANALYZABLE) (Continued)



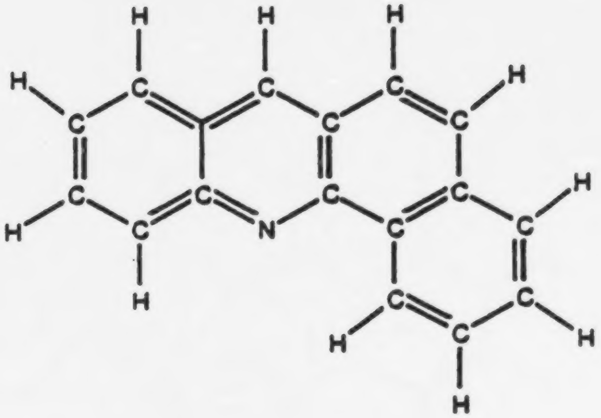
U157: 3-Methylcholanthrene



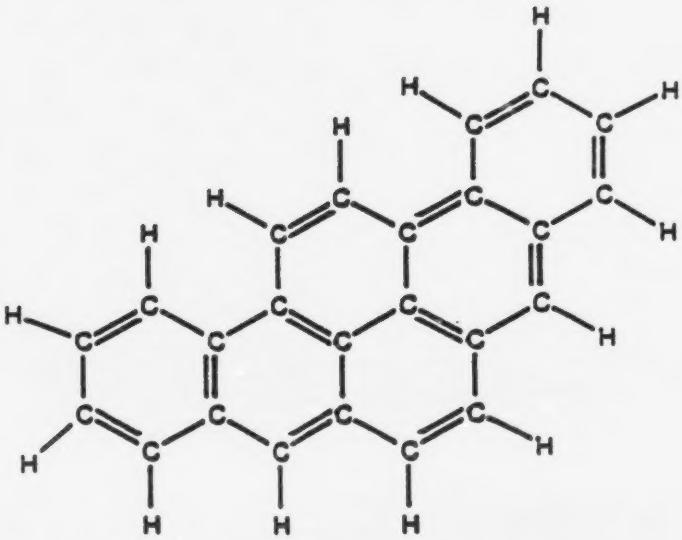
U165: Naphthalene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

POLYNUCLEAR AROMATIC WASTES
(NONANALYZABLE)



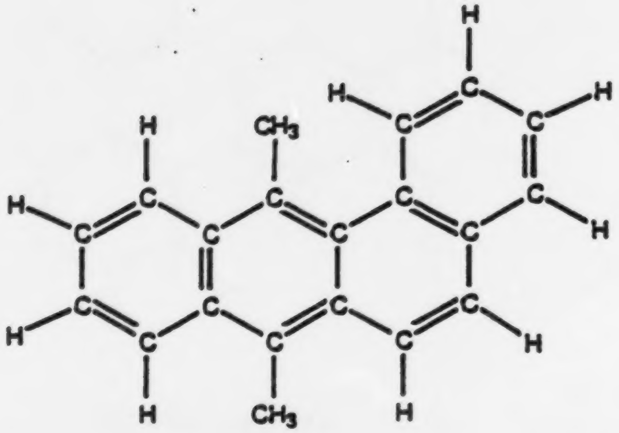
U016: Benz(c)Acridine



U064: 1,2,7,8-Dibenzopyrene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

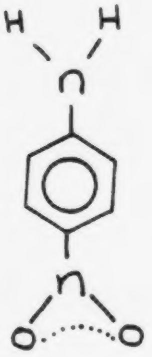
POLYNUCLEAR AROMATIC WASTES
(NONANALYZABLE) (Continued)



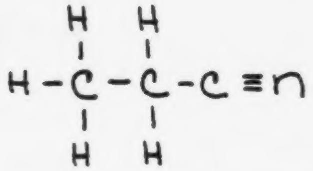
U094: 7,12-Dimethylbenz(a)anthracene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

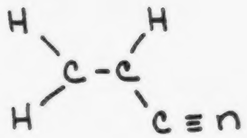
ORGANO-NITROGEN COMPOUND WASTES
(ANALYZABLE)



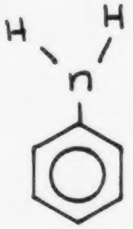
P077 P-Nitroaniline



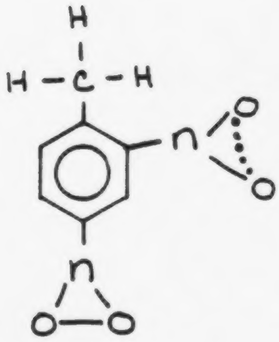
P101 Ethyl cyanide
(Propanenitrile)



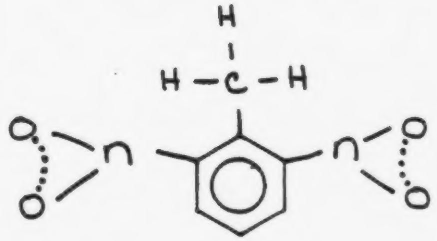
U009 acrylonitrile



U012 aniline



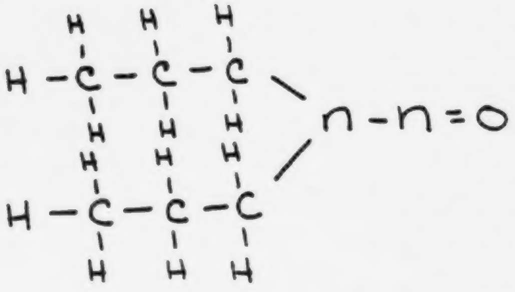
U105 2,4-Dinitrotoluene



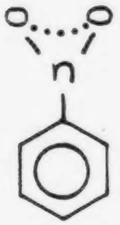
U106 2,6-Dinitrotoluene

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

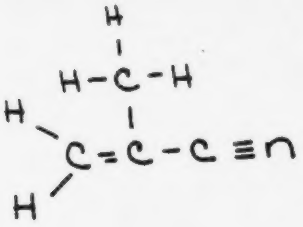
ORGANO-NITROGEN COMPOUND WASTES (ANALYZABLE) (Continued)



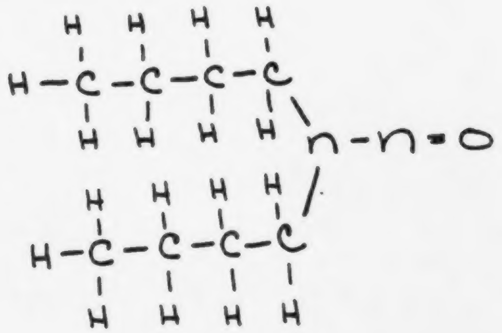
U111 Di-n-propylnitrosamine



U169 nitrobenzene



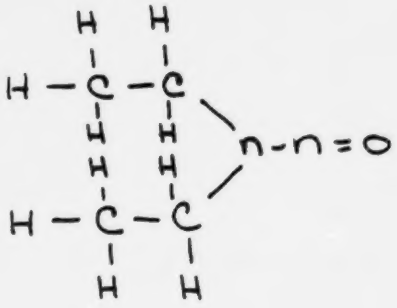
U152 Methacrylonitrile



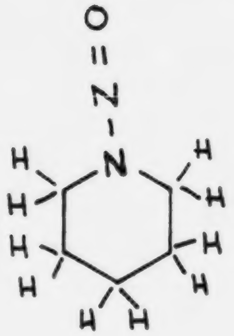
U172 n-nitroso-di-n-butyl-amine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

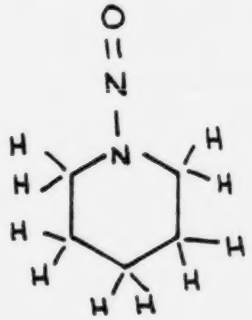
ORGANO-NITROGEN COMPOUND WASTES (ANALYZABLE) (Continued)



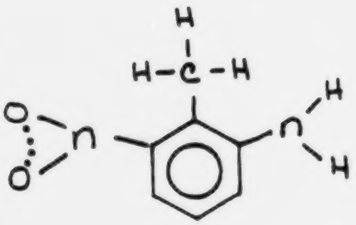
U174 n-Nitrosodiethylamine



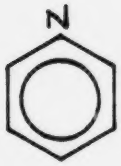
U179 n-Nitrosopiperidine



U180 n-Nitrosopyrrolidine



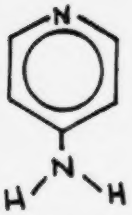
U181 5-Nitro-o-toluidine



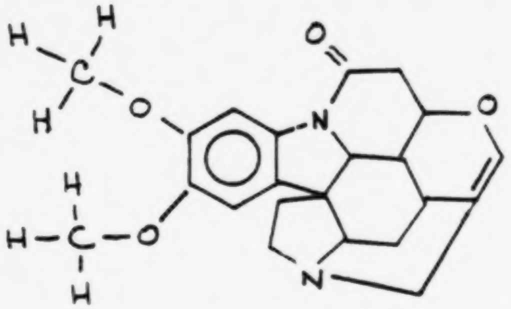
U196 Pyridine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

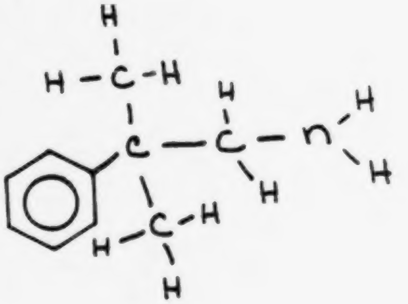
ORGANO-NITROGEN COMPOUND WASTES
(NONANALYZABLE)



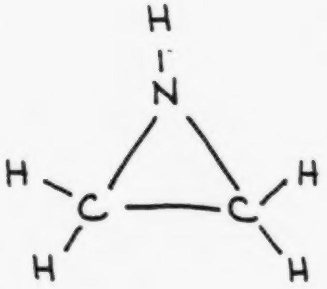
P008 4-aminopyridine



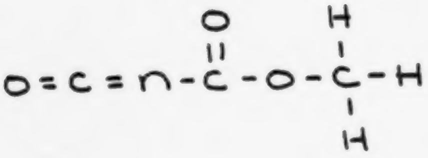
P018 Brucine



P046 alpha, alpha-dimethylphenethylamine

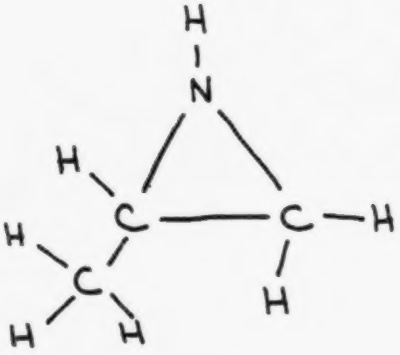


P054 aziridine



$O=C=N-\overset{\overset{\displaystyle O}{\|}}{C}-O-CH_3$

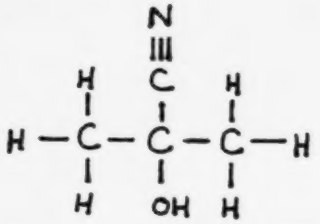
P064 Isocyanic acid, methyl ester



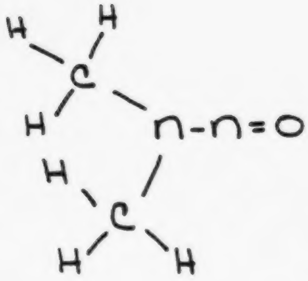
P067 2-methylaziridine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

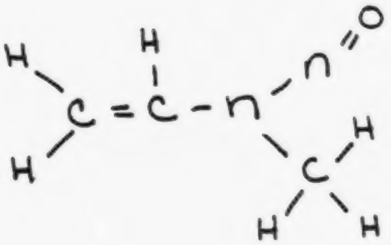
ORGANO-NITROGEN COMPOUND WASTES
(NONANALYZABLE) (Continued)



P069 METHYLLACTONITRILE



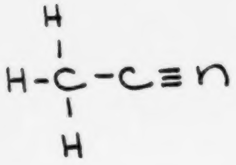
P082 n-nitrosodimethylamine



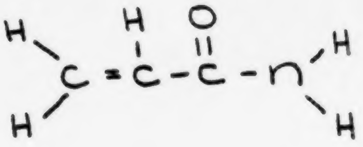
P084 N-Nitrosodimethylamine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

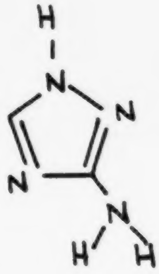
ORGANO-NITROGEN COMPOUND WASTES
(NONANALYZABLE) (Continued)



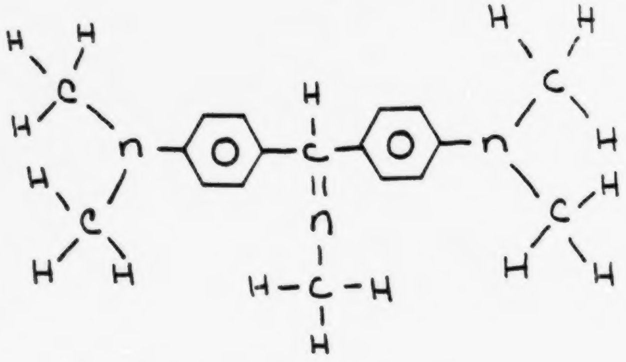
U003 Acetonitrile



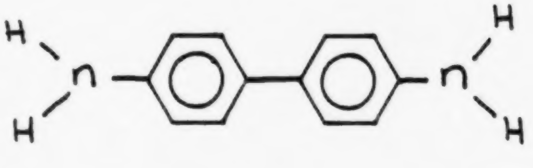
U007 Acrylamide



U011 Amitrole



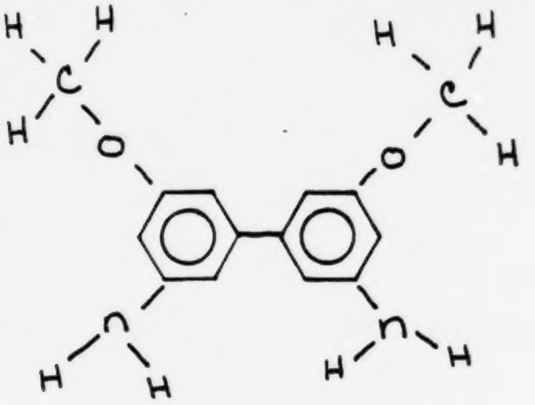
U014 Auramine



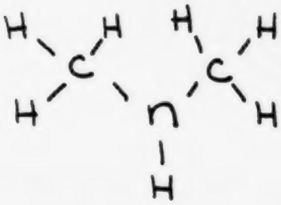
U021 Benzidine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

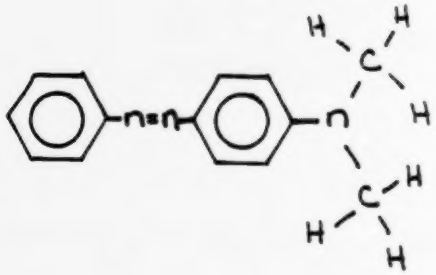
ORGANO-NITROGEN COMPOUND WASTES (NONANALYZABLE) (Continued)



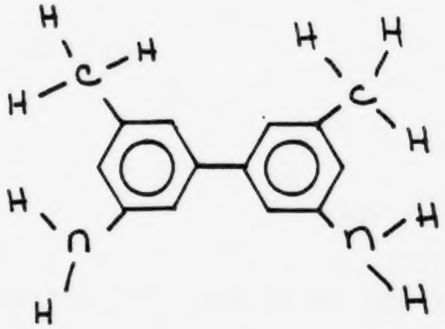
U091 3,3'-Dimethoxybenzidine



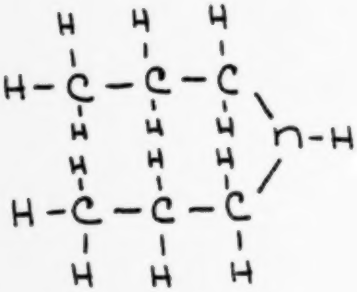
U092 Dimethylamine



U093 P-Dimethylamino-
azobenzene



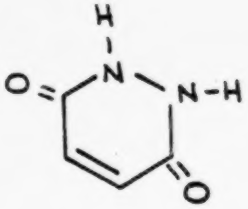
U095 3,3'-Dimethylbenzidine



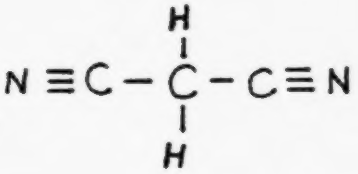
U110 Dipropylamine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

ORGANO-NITROGEN COMPOUND WASTES (NONANALYZABLE) (Continued)

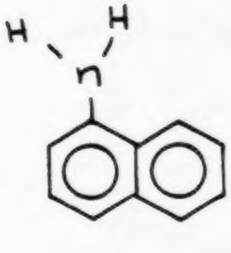


U148 maleic anhydride

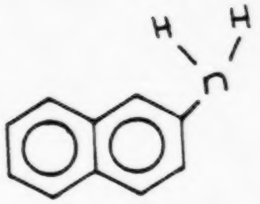


$N\equiv C-CH_2-C\equiv N$

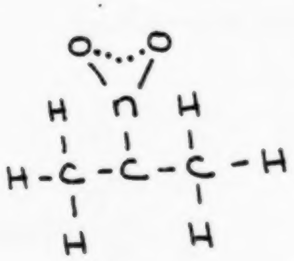
U149 MALONONITRILE



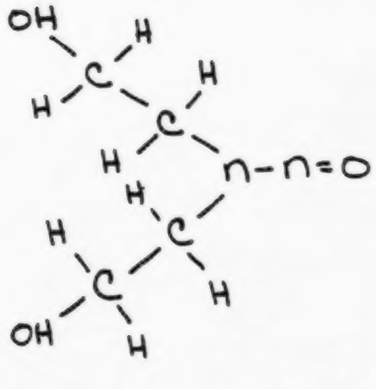
U167 1-naphthylamine



U168 2-naphthylamine



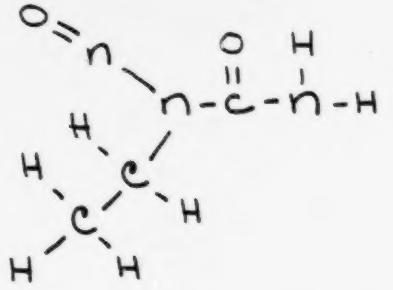
U171 2-nitropropane



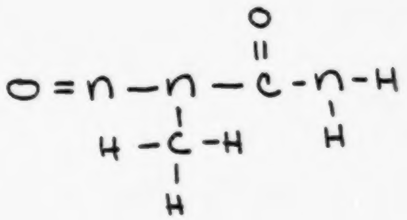
U173 n-nitroso-diethanolamine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

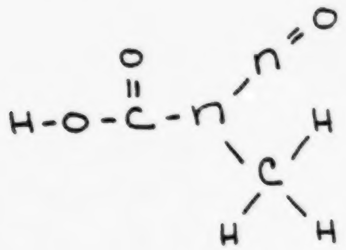
ORGANO-NITROGEN COMPOUND WASTES (NONANALYZABLE) (Continued)



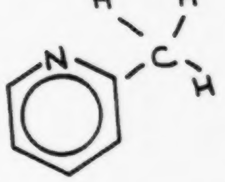
U176 n-nitroso-n-ethylurea



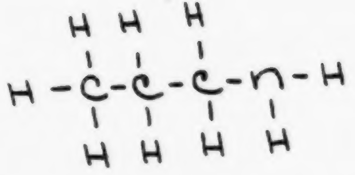
U177 n-nitroso-n-methylurea



U178 n-nitroso-n-methylurethane



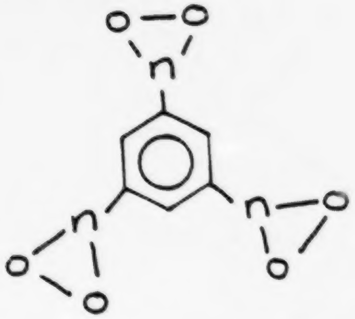
U191 2-picoline



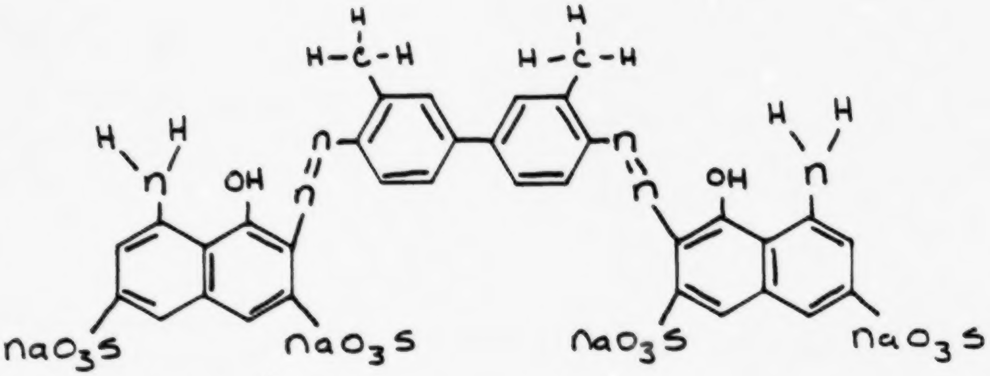
U194 n-Propylamine

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

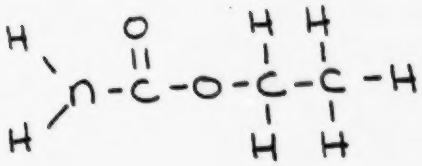
ORGANO-NITROGEN COMPOUND WASTES (NONANALYZABLE) (Continued)



U234 Sym-Trinitrobenzene


H
H-C-H
H
H-C-H
H H
n OH
n
n
OH
H H
n
NaO3S
NaO3S
NaO3S
NaO3S

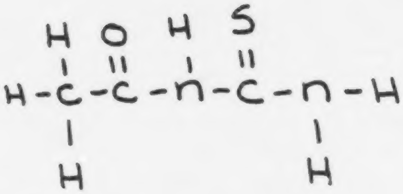
U236 Trypan Blue



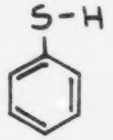
U238 Ethyl carbamate

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

ORGANO-SULFUR COMPOUND WASTES
(NONANALYZABLE)



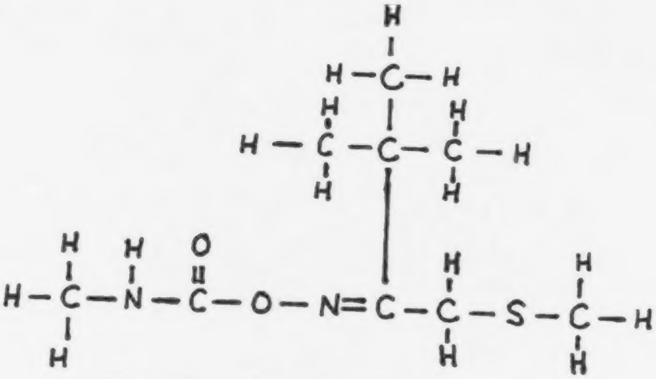
P002 1-Acetyl, 2-thiourea



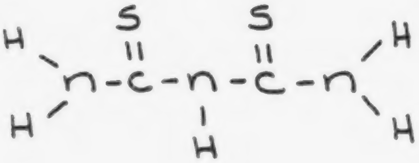
P014 Thiophenol

$S=C=S$

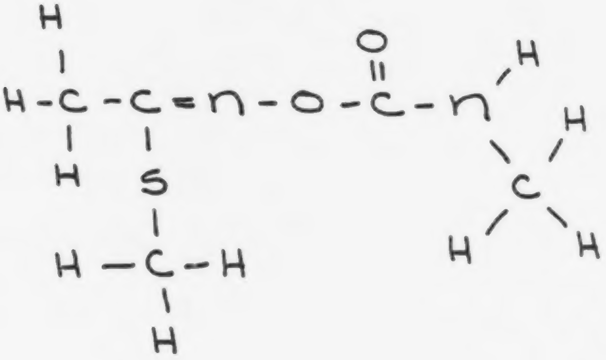
P022 Carbon disulfide



P045 THIOFANOX



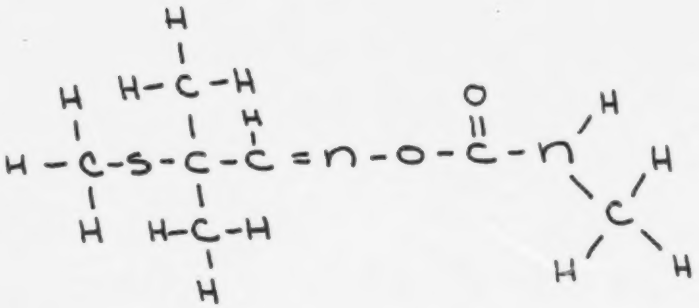
P049 2,4-Dithiobiuret



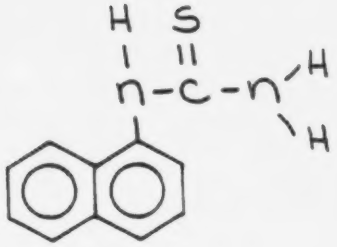
P066 Methomyl

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

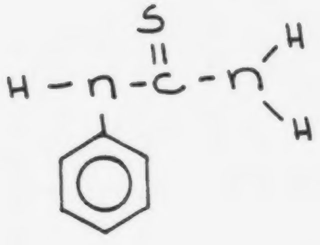
ORGANO-SULFUR COMPOUND WASTES (NONANALYZABLE) (Continued)



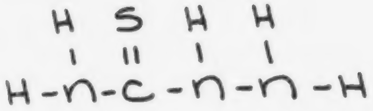
P070 aldicarb



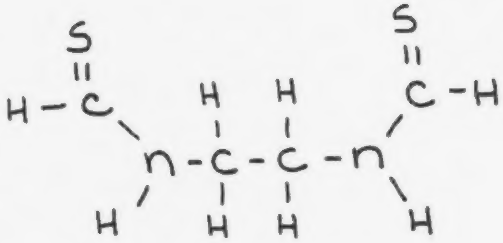
P072 1-Naphthyl-2-thiourea



P093 n-Phenylthiourea



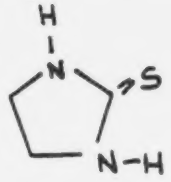
P116 Thiosemicarbazide



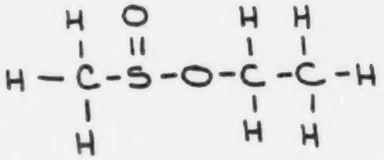
U114 Ethylene bis-dithiocarbamic acid

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

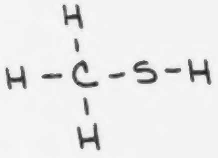
ORGANO-SULFUR COMPOUND WASTES
(NONANALYZABLE) (Continued)



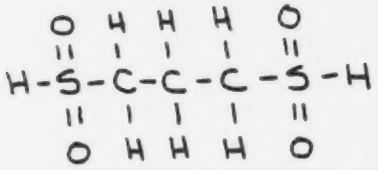
U116 Ethylene thiourea


H O H H
H — C - S - O - C - C - H
H H H

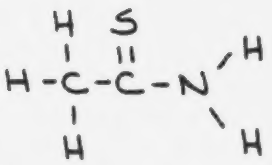
U119 Ethyl methane sulfonate



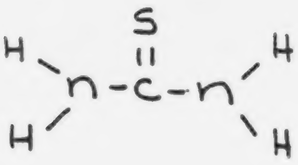
U153 methanethiol


O H H H O
H - S - C - C - C - S - H
O H H H O

U193 1,3-Propane sultone

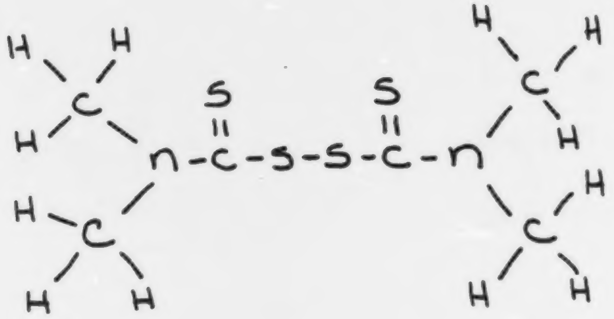


U218 Thiocetamide



U219 Thiourea

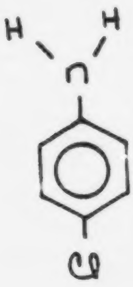
ORGANO-SULFUR COMPOUND WASTES (NONANALYZABLE) (Continued)



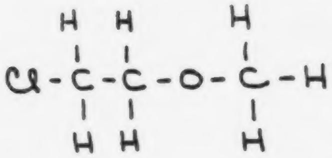
U244 Thiram

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

MISCELLANEOUS HALOGENATED ORGANIC WASTES (ANALYZABLE)

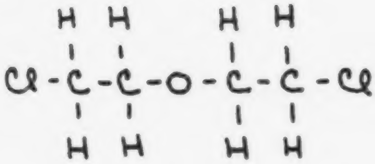


P024 p-Chloroaniline

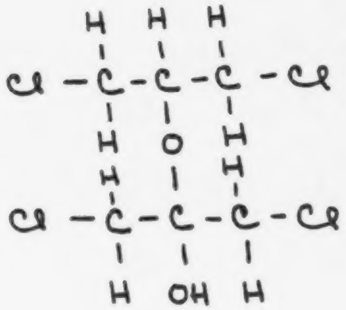


$Cl-CH_2-CH_2-O-CH_3$

U024 Bis-(2-chloroethoxy) methane



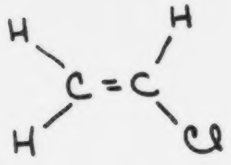
$Cl-CH_2-CH_2-O-CH_2-CH_2-Cl$



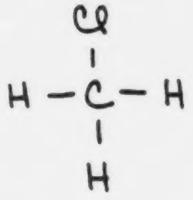
U025 Dichloroethyl ether U027 Bis-(2-chloroisopropyl) ether

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

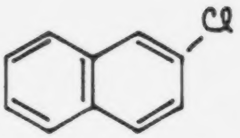
MISCELLANEOUS HALOGENATED ORGANIC WASTES
(ANALYZABLE) (Continued)



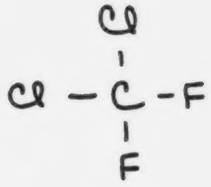
U043 Vinyl chloride



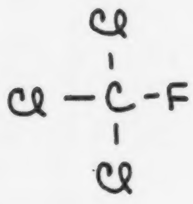
U045 Chloromethane



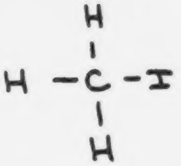
U047 2-Chloronaphthalene



U075 Dichlorodifluoromethane

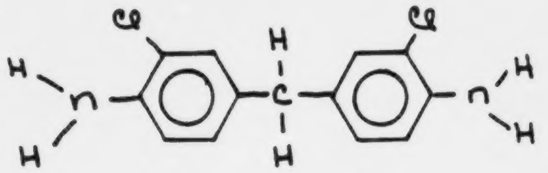


U121 Trichloromonofluoromethane

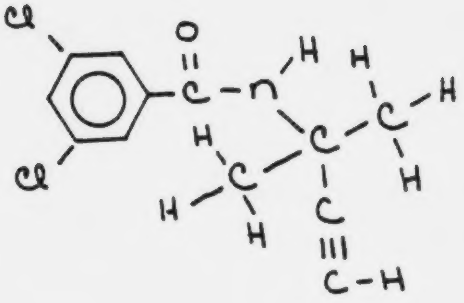


U138 Iodomethane

MISCELLANEOUS HALOGENATED ORGANIC WASTES (ANALYZABLE) (Continued)



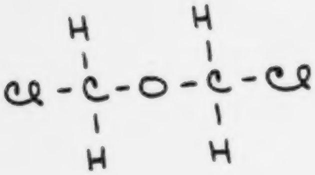
U158 4,4 methylene-bis-(2-chloro- aniline)



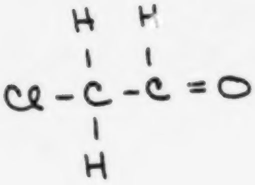
U192 Pronamide

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

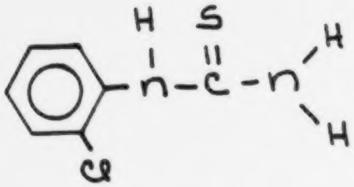
MISCELLANEOUS HALOGENATED ORGANIC WASTES (NONANALYZABLE)



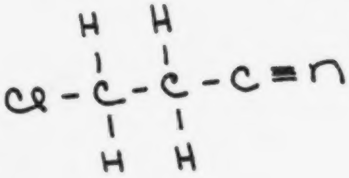
P016 Bis (chloromethyl) ether



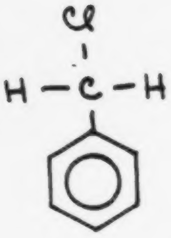
P023 Chloroacetaldehyde



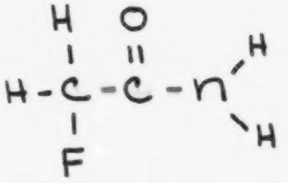
P026 1-(o-Chlorophenyl) thiourea



P027 3-Chloropropionitrile



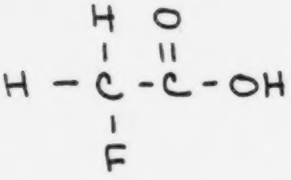
P028 Benzyl chloride



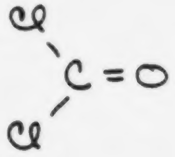
P057 2-Fluoroacetamide

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

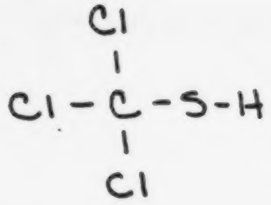
MISCELLANEOUS HALOGENATED ORGANIC WASTES (NONANALYZABLE) (Continued)



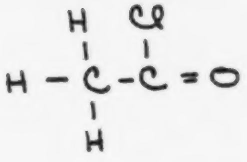
P058 Fluoroacetic acid



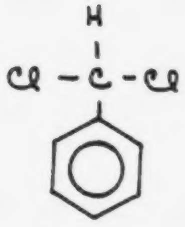
P095 Phosgene



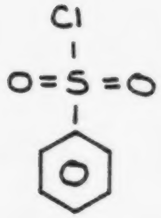
P118 Trichloromethanthiol



U006 acetyl chloride



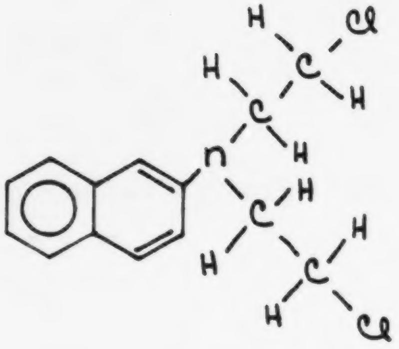
U017 Benzal chloride



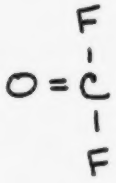
U020 Benzenesulfonyl chloride

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

MISCELLANEOUS HALOGENATED ORGANIC WASTES (NONANALYZABLE) (Continued)

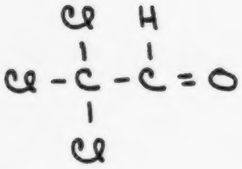


U026 Chlornaphazine



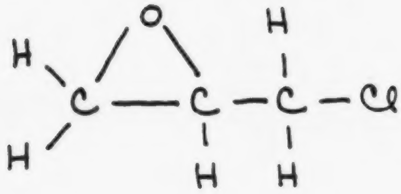
$$\mathrm{O=\underset{\displaystyle F}{\overset{\displaystyle F}{C}}}$$

U033 Carbonyl fluoride

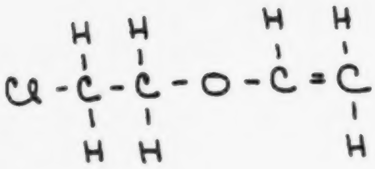


$$\mathrm{Cl-\underset{\displaystyle Cl}{\overset{\displaystyle Cl}{C}}-\overset{\displaystyle H}{C}=O}$$

U034 Trichloroacetaldehyde

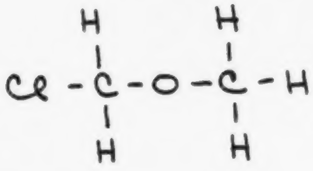


U041 1-Chloro-2,3-epoxypropane



$$\mathrm{Cl-\underset{\displaystyle H}{\overset{\displaystyle H}{C}}-\underset{\displaystyle H}{\overset{\displaystyle H}{C}}-O-\overset{\displaystyle H}{C}=\underset{\displaystyle H}{\overset{\displaystyle H}{C}}}$$

U042 2-Chloroethyl vinyl ether

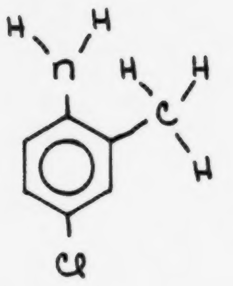


$$\mathrm{Cl-\underset{\displaystyle H}{\overset{\displaystyle H}{C}}-O-\underset{\displaystyle H}{\overset{\displaystyle H}{C}}-H}$$

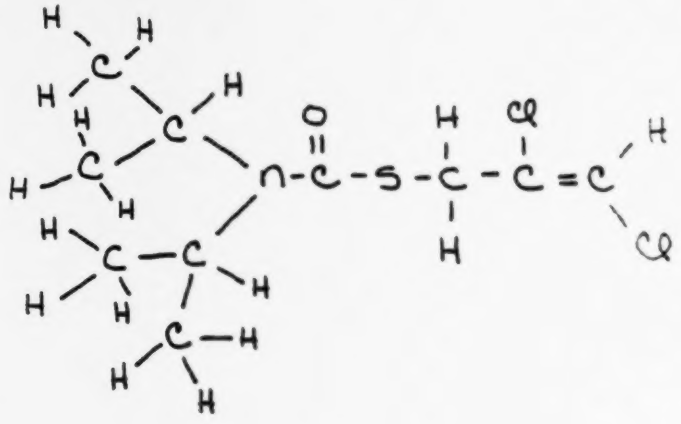
U046 Chloromethyl methyl ether

CHEMICAL STRUCTURES FOR U AND P WASTE CODES

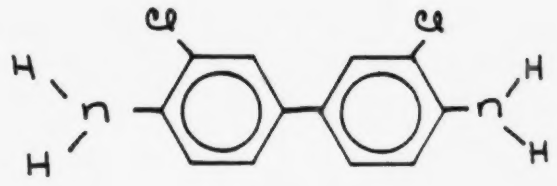
MISCELLANEOUS HALOGENATED ORGANIC WASTES (NONANALYZABLE) (Continued)



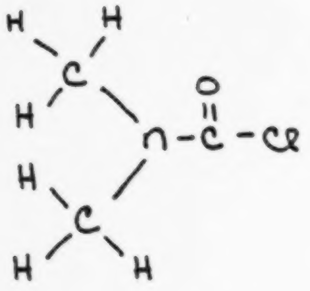
U049 4-Chloro-o-toluidine hydrochloride



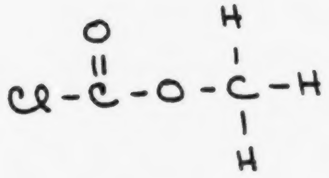
U062 Diallate



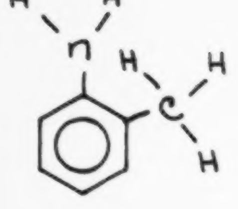
U073 3,3'-Dichlorobenzidine



U097 Dimethylcarbamoyl chloride



U156 methyl chlorocarbonate



U222 o-Toluidine hydrochloride

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U051	(continued)		Lubricant for die molds
		Plastics and Resins	Waterproofing agent
		Veterinary Medicine	Parasiticide, deodorant
		Pharmaceutical	External antiseptic, disinfectant, expectorant, local anesthetic, gastric sedative
		Wood Preserving	Preservative
U052	Cresols	Agricultural Chemicals	Herbicide manufacturing
U053	Crotonaldehyde	Organic Chemical Manufacturing	Chemical intermediate for 2-ethylhexyl alcohol
		Plastics and Resins Manufacturing	Solvent for polyvinyl chloride
		Tire	Preparation of rubber accelerators
		Petroleum Refining	Purification of lubricating oils
		Agricultural Chemical Manufacturing	Manufacture of insecticides
		Military	Manufacture of tear gas
		Organic Chemical Manufacturing	Organic synthesis
		Leather and Tanning	Leather tanning
U055	Cumene (Isopropylbenzene)	Organic Chemicals Manufacturing	Manufacture of phenol, acetone, acetophenone, a-methylstyrene
U056	Cyclohexane	Plastics and Resins	Solvent for lacquers and resins
		Paint	Paint and varnish remover
			Extraction of essential oils
		Laboratories	Molecular weight determination
		Organic Chemicals Manufacturing	Manufacture of adipic acid, benzene, cyclohexyl chloride, nitrocyclohexane, cyclohexanol, cyclohexanone
		Petroleum Refining	Manufacture of solid fuel for camp stoves
			In fungicidal formulations
			In recrystallization of steroids
U057	Cyclohexanone	Organic Chemical Manufacturing	Chemical intermediate in synthesis of caprolactam
		Plastics and Resins Manufacturing	Solvent for lacquers, wood stains, paint, and varnish removers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U057	(continued)		Solvent for polyvinyl chloride and its copolymers
		Leather and Tanning	Spot remover and degreaser for leather
U059	Daunomycin	Pharmaceuticals	Antineoplastic agent, antibiotic (not produced in U.S.)
U060	DDD	Pesticide	Nonsystemic contact and stomach insecticide
U061	DDT	Pesticide	Nonsystemic contact and stomach insecticide
U062	Diallate	Agricultural Chemicals	Sprout inhibitor Herbicide
U063	Dibenzo(a,h)anthracene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
U064	1,2,7,8-Dibenzopyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Experimental carcinogen
U066	1,2-Dibromo-3-chloropropane		Intermediate in organic synthesis
			Commercial preparation for flame retardant
		Agricultural Chemicals	Soil fumigant for pineapple in Hawaii
U067	Ethylene dibromide	Agricultural Chemicals	Quarantine fumigant some fruits & veg.
		Plastics and Resins	Solvent for resins,gums,waxes
			Chemical intermediate and in gauge fluids
			Vault fumigation

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U067	(continued)		Catalyst in preparation of Grignard reagents
			Chemical intermediate for vinyl bromide
		Dyes and Pigments	Chemical intermediate for dyes
		Food Processing	Spot fumigation milling machinery
		Pesticides	Termite and japanese beetle control Insecticidal fumigant for stored products Beehive supers Soil treatment (insects and nematodes)
		Pharmaceuticals	Chemical intermediate for pharmaceuticals
		Timber	Felled log fumigation
U068	Dibromomethane		Organic synthesis
			Gauge fluid
			Ingredient of fire-estinquishing fluids
			Heavy liquid in solid separations
		Plastics and Resins	Solvent for waxes & resins
U070	1,2-Dichlorobenzene	Pesticide	Fumigant and insecticide
U071	1,3-Dichlorobenzene		No information available
U072	1,4-Dichlorobenzene	Pesticide	Manufacture of moth repellant, soil fumigant
U073	3,3'-Dichlorobenzidine		Curing agent
		Dyes and Pigments	Paint and ink formulation Manufacture of AZO dyes Chemical intermediate for dyes
		Plastics	Plastic compounding ingredient
		Rubber	Rubber compounding ingredient
U074	1,4-Dichloro-2-butene	Organic Chemicals Manufacturing	Chemical intermediate for hexamethylenediamine and chloroprene
		Pesticide	Nematocides and as chemical intermediate
U075	Dichlorodifluoromethane	Health and Safety	Leak-detecting agent
			Refrigerant

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U075	(continued)	Plastics	Polymerization catalyst
		Adhesive and Sealants Industry	Aerosol propellent
		Agricultural Chemicals	Aerosol propellent
		Automobile Manufacturing	Refrigerant for air conditioning
		Bottle Manufacturing	No information available
		Cosmetics Manufacturing	Aerosol propellent
		Electrical Equipment	Manufacturing electrical insulation and generator windings
		Food Processing	Solvent or diluent in fumigants for food sterilization
		Food Processing	Freezing of foods
		Food Service/Restaurant	Chilling of glasses
		Medicine	Preparation of frozen tissue sections
		Metals Manufacturing	Copper and aluminum purification
		Organic Chemicals	Synthesis of Freons
		Paint Manufacturing and Application	Used in paints & varnish removers
		Paint Manufacturing and Application	Aerosol propellant
		Petroleum Refining	Petroleum recovery
		Pharmaceutical Manufacturing	Aerosol propellant
			Refrigerant in home & commercial applications
		Plastics	Used in polymerization process
			Aerosol propellant in cleaners
			Working fluid for heat pumps and in hydraulic fluids
			Foaming agent for surfactants
			Foaming agent in fire extinquishers
			Water purification
			Used in thermal expansion valves
U076	1,1-Dichloroethane	Organic Chemicals Manufacturing	Chemical intermediate for vinyl chloride, 1,1,1-trichloroethane

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U077	1,2-Dichloroethane		Solvent for fat and oils
		Plastics and Resins	Solvent for waxes, gum, resins
			Fumigant
U078	1,1-Dichloroethylene	Organic Chemicals Manufacturing	Intermediate for vinilydene polymer plastics
U079	1,2-Dichloroethylene		Solvent for fats, phenol, camphors
U080	Methylene chloride		Solvent for cellulose acetate
			Degreasing and cleaning fluids
		Food Processing	Solvent
U081	2,4-Dichlorophenol	Organic Chemicals Manufacturing	Organic synthesis
U082	2,6-Dichlorophenol	Pesticide	Systemic herbacide
U083	1,2-Dichloropropane		Oil and fat solvent
		Dry Cleaning	In dry cleaning fluids
			In degreasing
		Pesticide	Insecticidal fumigant mixtures
U084	1,3-Dichloropropene		Oil and fat solvent
		Dry Cleaning	In dry cleaning fluids
			In degreasing
		Pesticide	Insecticidal fumigant mixtures
U085	1,2:3,4-Diepoxybutane	Commercial Testing Laboratories	Research chemical
U089	Diethylstilbestrol	Pharmaceuticals/Medicine	No longer used
U090	Dihydrosafrole		Chemical intermediate for piperonyl butoxide (not in U.S.)
		Flavor	Flavoring agent in root beer
		Cosmetics and Fragrances	Fragrance for cosmetics
U091	3,3'-Dimethoxybenzidine		Detection of thiocyanates, nitrites, & some metals
		Tanning, Paper, Rubber, Textiles	Dye
			Chemical intermediate in production of O-dianisidine diisocyanate

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U091	(continued)	Dyes and Pigments	Chemical intermediate in dyes and pigments
U092	Dimethylamine		Reagent for magnesium
			Missile fuel
		Dyes and Pigments	Dyes
			Ion exchange agent
			Chemical intermediate for lauryl dimethylamine oxide
		Detergents	Manufacture of detergents
			Surfactant
		Pharmaceuticals	No information available
		Petroleum Refining	Antiknock agent in fuels Gasoline stabilizer
		Agricultural Chemicals	Attract boll weevils
			Antioxidants
			Dehairing agent
		Textiles	Textile chemicals
			Electroplating
			Acid gas absorbent
			Flotation agent
		Pesticides	Pesticide propellant
			Chemical intermediate for dimethylformamide,dimethylacetamide
		Plastics and Resins	Plasticizer
			Rocket propellant
			Dimethylamine salt of 2,4-D
		Film	Photographic chemical
		Leather and Tanning	Tanning
		Rubber	Accelerator in vulcanizing rubber
U093	p-Dimethylaminoazobenzene		Not produced or used in U.S.

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U094	7,12-Dimethylbenz(a)anthracene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Induces malignant tumors in testing of antineoplastic drugs
U095	3,3'-Dimethylbenzidine		Free chlorine in water
			Reagent for gold detection
			In chlorine test kits & test tapes in clinical laboratories
		Dyes and Pigments	Chemical intermediate for AZO dyes
		Plastics and Resins	Curing agent for urethane resins
U097	Dimethyl carbonyl chloride		Chemical intermediate for parasympathomimetic agents
		Pesticides	Pesticide (former use)
U101	2,4-Dimethyl phenol	Pesticide	Insecticide, fungicide
U105	2,4-Dinitrotoluene	Dyes and Pigments	Chemical intermediate for dyes
			Production of toluenediamine (Ramey nickel slurry process)
			Chemical intermediate in production of toluene diisocyanate
		Explosives	Added to sensitizing materials in dynamite Plasticizer in moderate and high explosives Gelatinizing & waterproofing agent Explosives intermediate
		Munition	Modifier for smokeless powders
		Plastics and Resins	Plastics manufacture
		Rubber	Rubber chemical
U106	2,6-Dinitrotoluene		Chemical intermediate for toluene-2,2-diamine
			Synthesis of urethane polymers, flexible & rigid foams

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U106	(continued)	Dyes and Pigments	In dyes
		Explosives	In synthesis of TNT Gelatinizing and waterproofing agent in explosives
		Plastics and Resins	Surface coatings
U108	1,4-Dioxane	Cosmetics and Fragrances	Manufacture of cosmetic products
		Paint Manufacturing	Manufacture of lacquers, paints, varnishes, paint
		Paper Processing	Solvent in pulping of wood
		Dyes and Pigments Manufacturing	Wetting and dispersing agent in textile processing, dye-baths, stain and printing compositions
		Cleaning Products	Manufacture of cleaning and detergent preparations, adhesives, fumigants, emulsions, and polishing compositions
		Organic Chemical Manufacturing	Solvent for fats, oils, waxes
		Plastics and Resins Manufacturing	Solvent for natural and synthetic resins
			Purification of perfluoro-compounds
U110	Dipropylamine		Chemical intermediate for S-propyl-di-n-propylthiocarbamate
		Agricultural Chemicals	Chemical intermediate for herbicide S-ethyl-di-n-propylthiocarbamate
U111	Di-n-propylnitrosamine		Research chemical
U112	Ethyl acetate	Organic Chemical Manufacturing	Organic synthesis
		Medicine	Carminative, antispasmodic, and counterirritant
			Component of base sheet (cellophane)
		Food Processing	Diluent in inks for marking fruits and vegetables, synthetic flavoring
		Plastics and Resins Manufacturing	Solvent for plastics
		Printing	Solvent for inks
		Paint Manufacturing	Solvent for varnishes, lacquers
		Munitions	Manufacture of smokeless powder
		Film	Manufacture of photographic films and plates

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U112	(continued)	Leather and Tanning	Manufacture of artificial leather
		Cosmetics and Fragrances	Manufacture of perfumes and fragrances
U113	Ethyl acrylate	Paint Manufacturing	Emulsion polymers for trade sale paints
		Textiles	Textile coating and printing
		Paper Coating	Paper coatings
		Cleaning Products	Floor finishes
		Adhesives and Sealants	Emulsion polymers for adhesives and sealants
		Leather and Tanning	Leather finishes
		Food Processing	Synthetic flavorings
U114	Ethylene bis-dithiocarbamic acid	Agricultural Chemicals	Heavy metal salts as fungicides
U116	Ethylene thiourea		Electroplating baths
			Intermediate for antioxidants
		Agricultural Chemicals	Intermediate for fungicides
		Dyes and Pigments	Intermediate for dyes
		Pesticides	Intermediate for insecticides
		Pharmaceuticals	Intermediate for pharmaceuticals
		Plastics and Resins	Manufacture of synthetic resins
		Rubber	Accelerator for neoprene rubbers
U117	Diethyl ether	Organic Chemical Manufacturing	Solvent for waxes, fats, and oils
			Reagent for organic synthesis
			Chemical intermediate for monoethanolamine, ethylene
		Cosmetics and Fragrances	Solvent for perfumes
		Explosives	Manufacture of gun powder
		Automotive	Primer for gasoline engines
		Commercial Testing Laboratories	Extractant of hormones from plant and animal tissues
		Veterinary Medicine	Inhalation anesthetic, antispasmodic, rubefacient

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U118	Methacrylic acid, ethyl ester	Plastics and Resins Manufacturing	Comonomer in acrylic polymers for surface coating resins
		Cleaning Products	Acrylic emulsion polymers for polishes
		Pharmaceutical Manufacturing	Comonomer in denture base material
U119	Ethyl methane sulfonate	Biochemical Research	Not produced in U.S.
U120	Fluoranthene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
			In lining for steel and ductile iron potable water pipes and storage tanks
		Chemical Research	Research chemical
U121	Fluorotrichloromethane		Sulfonation solvent in chemical synthesis
			Dielectric fluid in bubble chambers in wind tunnels
			Aerosol propellant
			Blowing agent in production of polyurethane foam
			Production of polymeric resins
			Chemical intermediate
		Agricultural Chemicals	Aerosol propellant
		Cosmetic and Fragrance	Aerosol propellant
		Electrical Equipment	Electric insulation
		Food Processing	No information available
		Organic Chemicals	Manufacture cleaning compounds
		Paint Manufacturing and Application	Aerosol propellant
		Pharmaceuticals	Aerosol propellant
			Manufacture fire extinguishers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U121	(continued)		
			Aerosol propellant (floor waxes)
			Refrigerant
U122	Formaldehyde		Solvent and degreasing agent
		Plastics and Resins Manufacturing	Chemical intermediate for phenolic, polyacetal and melamine resins
			Chemical intermediate for resorcinol-formaldehyde and aniline-formaldehyde resins
		Organic Chemical Manufacturing	Chemical intermediate for acetylenic chemicals, (1,4-butanediol), polyols (pentaerythritol), hexamethylenetetramine, methylene dianiline, pyridine chemicals, nitroparaffin derivatives
		Tire	Chemical intermediate for rubber processing chemicals
		Medicine	Disinfectant
			Embalming agent
		Dyes and Pigments Manufacturing	Component of dyes as starch preservative
		Leather and Tanning	Chemical intermediate for synthetic tanning agent
		Explosives	Chemical intermediate for explosives
U123	Formic acid	Agriculture	Soil sterilant in mushroom houses before planting
		Agricultural Chemical Manufacturing	Manufacture of fumigants, insecticides
		Paint Manufacturing	Manufacture of commercial paint strippers, lacquers
		Textiles	Dyeing and finishing of textiles
		Organic Chemical Manufacturing	Preparation of organic esters
			Manufacture of refrigerants
		Cosmetics and Fragrances	Solvent for perfumes
		Medicine	Antiseptic
			Silvering glass
		Fiber Manufacturing	Cellulose formate
			Ore floatation

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U123	(continued)	Plastics and Resins Manufacturing	Manufacture of vinyl resin plasticizers
		Leather and Tanning	Leather tanning
U124	Furan	Organic Chemical Manufacturing	Chemical intermediate for tetrahydrofuran
U125	Furfural	Organic Chemical Manufacturing	Organic synthesis for pyrrole, thiophene
		Petroleum Refining	Solvent in extraction of butadiene from C4 streams
			Refining of lubricating oils
		Adhesives and Sealants	Constituent of rubber cement
		Food Processing	Synthetic flavoring ingredient
		Plastics and Resins Manufacturing	Solvent for synthetic and natural resins
		Medicine	Screening test for urine
		Paint Manufacturing	Manufacture of varnishes
		Agricultural Chemical Manufacturing	Insecticide, fungicide, germicide
		Automotive	Wetting agent in the manufacture of abrasive wheels and brake linings
U126	Glycidylaldehyde	Commercial Testing Laboratories	Research chemical
		Wool Weaving and Finishing	Cross-linking agent for finishing of wool
		Leather and Tanning	Oil tanning and fat-liquoring of leather
		Medicine	Oil tanning and fat-liquoring of surgical sutures
			Protein insolubilization
			Chemical intermediate in glycerol manufacture
U127	Hexachlorobenzene	Pesticide	Fungicide
U128	Hexachlorobutadiene	Rubber	Solvent for rubber
U129	Lindane	Pesticide	Insecticide
U130	Hexachlorocyclopentadiene	Pesticide Manufacturing	Chemical intermediate for aldrin, dieldrin, endrin, endosulfan, chlordane, heptachlor, isodrin
U131	Hexachloroethane		Solvent
		Explosive	Explosives

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U131	(continued)		Camphor substitute in celluloid
		Rubber	Vulcanizing accelerator
U132	Hexachlorophene	Soap	In soap and germicidal preparations
		Cosmetics	In cosmetic preparations
U137	Ideno(1,2,3-c,d)pyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U138	Iodomethane		Chemical intermediate for methylamines & quarternary ammonium iodides
			Chemical intermediate for for phosponium iodides
			Chemical intermediate for organometallics
			Alkylating agent
		Pharmaceuticals	Methylating agent in prep. pharmaceutical intermediates
			Microscopy
			Building block for radioactive tracers synthesis
			Testing for pyridine
			As imbedding material of diatom examination
			As fire extinquisher
U140	Isobutyl alcohol	Food Processing	Manufacture of food additives
		Plastics and Resins Manufacturing	Solvent for surface coatings and adhesives
			Chemical intermediate for isobutyl esters used as plasticizers
		Cosmetics and Fragrances	Manufacture of perfumes
		Pharmaceutical Manufacturing	Processing solvent for pharmaceuticals

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U140	(continued)	Agricultural Chemical Manufacturing	Processing solvent for pesticides
		Organic Chemical Manufacturing	Chemical intermediate for isobutylamines, zinc diisobutyldithiophosphate, isobutyl acetate, acrylate and methacrylate esters
			Diluent-reagent in the alkylation of amino resins
		Petroleum Refining	Cosolvent in tertiary oil recovery
			Chemical intermediate for isobutyl esters used as plasticizers
U141	Isosafrole	Flavor	In root beer (former use) and sarsaparilla flavors
			Manufacture heliotropin
			Chemical intermediate for dihydrosafrole (not in U.S.)
			Manufacture pesticide synergists
		Cosmetic and Fragrance	Modify oriental perfumes
U143	Lasiocarpine	Medicine	Research chemical
U147	Maleic anhydride	Organic Chemical Manufacturing	Diene syntheses, co-polymerization reactions
			Chemical intermediate for fumaric acid, malic acid
			Chemical intermediate for surfactants, chlorendic anhydride and acid, rosin adducts
		Plastics and Resins Manufacturing	Manufacture of alkyd-type resins, reactive plasticizers
			Comonomer for unsaturated polyester resins
		Dyes and Pigments Manufacturing	Manufacture of dye intermediates
		Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
		Agricultural Chemical Manufacturing	Manufacture of agricultural chemicals
		Petroleum Refining	Chemical intermediate for lube oil dispersants and corrosion inhibitors
U148	Maleic anhydride		Synthesis of pyridazine
			Uracil antimetabolite
		Agricultural Chemicals	Weed control in mixture with 2,4-D Inhibits plant growth (tobacco, potato & onions)

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U148	(continued)		Sugar content stabilizer in beets Fungicidal
U149	Malonitrile		Photosensitizer
		Medicine	Formerly used to treat mental illness
			Acrylic fiber and dyestuff synthesis
			Organic synthesis
		Lubricant	Lubricating oil additive
			Leaching agent for gold
		Medicine	Thiamine synthesis
		Medicine	Anti-cancer agent synthesis
U150	Melphalan	Medicine	Antineoplastic agent
U152	Methacrylonitrile		Preparation of homopolymers & copolymers
			Intermediate in preparation of acids, amides, amines, esters, nitriles
			Monomer for copolymers
			Monomer for polymethacrylonitrile
		Plastics and Resins	Manufacture of elastomers, coatings, plastics
U153	Methanethiol	Flavor	Synthetic flavoring and adjuvants
			Synthesis of methimine
			Synthetic flavoring substances and adjuvants
			Catalyst
			Gas odorant for hazardous gases
			Synthesis of methimine
		Agricultural Chemicals	Intermediate in fungicides
		Pesticides	Intermediate in pesticide manufacture
		Petroleum Refining	Intermediate in jet fuels manufacture
		Plastics and Resins	Intermediate in plastics manufacture
U154	Methyl alcohol		Kill animal pathogenic bacteria and maggots on

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U154	(continued)		household contents, mortuary instruments, human bedding and clothing, tissues, human stools, and cadavers
		Agricultural Chemicals	Treatment against onion smut, dutch elm disease, and wood root Removal of toxic organic pollutants from soil
		Petroleum Refining	Kill slime forming bacteria in oil recovery injection water and packer fluid
		Printing	Duplicating fluid
			Removal of 2,4-dinitrotoluene from spent carbons
U155	Methapyrilene	Pharmaceuticals	Sedative in sleeping aids Antihistaminic
		Veterinary Medicine	Antihistaminic agent
U156	Methyl chlorocarbonate		In organic synthesis
		Pesticides	In insecticides
U157	3-Methylcholanthrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Induces specific forms of cytochrome in cancer research
U158	4,4-Methylene-bis-(2-chloroaniline)		Components in home appliances
			Manufacture of radar systems
		Munitions	Manufacture of gun mounts
		Aircraft	Manufacture of jet engine turbine blades
		Plastics and Resins Manufacturing	Curing agent
U159	Methyl ethyl ketone	Paint Manufacturing	Manufacture of paint removers
		Cement	Manufacture of cements

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U159	(continued)	Adhesives and Sealants	Manufacture of adhesives
			Solvent for adhesives
		Cleaning Products	Cleaning fluids
		Organic Chemical Manufacturing	Organic synthesis
			Oxidation promoter in manufacture of terephthalic acid from p-xylene
		Building Products	Solvent for coatings
		Magnetic Tape	Solvent for magnetic tape
		Printing	Solvent for printing inks
		Agricultural Chemical Manufacturing Medicine	Solvent for cosolvent in pesticide formulations Sterilizer for baterial spores on surgical instruments, hypodermic needles/syringes, and dental instruments
U161	Methyl isobutyl ketone	Pharmaceutical Manufacturing	Denaturant for rubbing alcohol Manufacture of antibiotics
		Paint Manufacturing	Solvent for paints, varnishes, cellulose lacquer Manufacture of methyl amyl alcohol
		Organic Chemical Manufacturing	Organic synthesis, extraction processes
		Dry Cleaning	Manufacture of dry cleaning preparations
		Food Processing	Manufacture of synthetic flavoring substances
U162	Methyl methacrylate	Organic Chemical Manufacturing	Monomer for polymethyl methacrylate, comonomer for copolymers
			Chemical intermediate for higher methacrylate esters
U163	N-Methyl,N-nitro-,N-nitroguanidine		Laboratory preparation of diazomethane (former use)
		Medicine	Research chemicals
U164	Methylthiouracil	Human/Veterinary Medicine	Anti-thyroid agent (Not produced in U.S.)
U165	Naphthalene	Organic Chemicals Manufacturing	Manufacture of phthalic and anthranilic acids, naphthols, naphthylamines, sulfonic acid
		Plastics and Resins	Manufacture of synthetic resins
			Manufacture of cellulowid, lampblack, smokeless powder
			Preparation of anthiaquinone

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U165	(continued)	Dyes and Pigments	Manufacture of indigo
			Formation of perylene
		Pesticide	Chemical intermediate for 1-naphthyl-n-methyl carbamate insecticide
		Leather and Tanning	Chemical intermediate for beta-naphthol and synthetic tanning chemicals
			Chemical intermediate for naphthalene sulfactants
		Veterinary Medicine	Insecticide, antiseptic, vermicide
			Ingredient in moth repellant and toilet bowl deodorants
			Manufacture of hydronaphthalenes used as solvents in lubricants and motor fuels
U166	1,4-Naphthoquinone	Tire	Polymerization regulator for rubber
		Plastics and Resins Manufacturing	Polymerization regulator for polyester resins
		Dyes and Pigments Manufacturing	Synthesis of dyes
		Pharmaceutical Manufacturing	Synthesis of pharmaceuticals
		Agricultural Chemical Manufacturing	Algicide
U167	1-Naphthylamine		Chemical intermediate for imidazoline adrenergic agent
			Chemical intermediate for N-1-Naphthylphthalmic acid herbicide
			Toning prints made with cerium salts
		Dyes and Pigments	Chemical intermediate for dyes
		Pesticides	Chemical intermediate for 1-Naphthylthiourea rodenticide (former use)
		Pesticides	Chemical intermediate for fluoroacetamide miticide (former use)
		Rubber	Chemical intermediated for N-Phenyl-1-Naphthylamine rubber antioxidant
U168	2-Naphthylamine		Production 2-chloronaphthylamine
		Dyes and Pigments	Former chemical intermediate for dyes
		Rubber	Former chemical intermediate for rubber antioxidants
		Rubber	Formerly in manufacture of rubber
U169	Nitrobenzene		Solvent

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U169	(continued)	Jewelry	Ingredient of metal polishes
			Manufacture pyroxylin compound
		Plastics and Resins	Preservative in spray paints
			Solvent for cellulose ethers
			Chemical intermediate for aniline, dichloroanilines
			Refining lubricating oils
			In soaps, shoe polishes
		Food	Substitute for almond essence
			Production of isocyanates
			Modifying esterification of cellulose acetate
			Constituent of floor polishes
		Pesticides	Production of pesticides
		Pharmaceuticals	Production of pharmaceuticals (acetominophen)
		Rubber	Production of rubber chemicals
U170	4-Nitrophenol	Pesticide	Production of parathion, fungicide
U171	2-Nitropropane	Paint and Varnish	Paint and varnish removal
			Chemical intermediate for 2-Amino-2-methyl-1-propanol
			Increase wetting ability & electrostatic spraying properties
			Solvent for chemical reactions
			Provide better flow characteristics & film integrety
			Chemical synthesis
		Dyes and Pigments	Insure greater pigment dispersion
			Co-solvent for coatings, ink, & adhesives
			Insure more complete solvent release
		Munitions	Rocket propellant
			Improve drying time in solvent systems

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U171	(continued)		Processing solvent for extractions and separations
		Coating	Acid-proof lacquer on battery cases
		Coating	Solvent systems
		Dyes and Pigments	Intermediate in synthesis of dyes
		Pesticides	Intermediate in synthesis of insecticides
		Petroleum Refining	Racing car fuel Gasoline additive Smoke depressant in diesel fuel
		Pharmaceuticals	Intermediate in synthesis of pharmaceuticals
U172	N-Nitroso-di-n-butylamine	Research	Research chemical
U173	N-Nitroso-diethanolamine	Research	Researh chemical
U174	N-Nitrosodiethylamine	Research	Research chemical
			Stabilizer
			Antioxidant
		Petroleum Refining	Gasoline and lubricant additive
U176	N-Nitroso-N-ethylurea	Research	Research chemical
			Laboratory preparation of diazoethane
U177	N-Nitroso-N-methylurea		Mutagenic effects on various plants
			Laboratory synthesis of diazomethane
U178	N-Nitroso-N-methylurethane		Laboratory synthesis of diazomethane
		Research	Research chemical
U179	N-Nitrosopiperidine	Research	Research chemical
U180	N-Nitrosopyrrolidine	Research	Research chemical
U181	5-Nitro-o-toluidine	Dyes and Pigments	Chemical intermediate for pigments and dyes
U182	Paraldehyde	Organic Chemical Manufacturing	Substitute for acetaldehyde
			Solvent for fats, oils, waxes
		Dyes and Pigments Manufacturing	Manufacture of dyestuff intermediates

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U182	(continued)	Plastics and Resins Manufacturing	Solvent for gums, resins
		Leather and Tanning	Manufacture of leather
		Fiber Manufacturing	Mixtures for cellulose derivatives
U183	Pentachlorobenzene		No information available
U184	Pentachloroethane		Solvent for oil and grease in metal cleaning
		Coal	Seperation of coal from impurities
		Agricultural Chemicals	Soil sterilization
		Organic Chemicals Manufacturing	Solvent for cellulose acetate, cellulose esthers, resins
		Lumber	Drying agent for timber
U185	Pentachloronitrobenzene	Agricultural Chemical	Fungicide
U186	1,3-Pentadiene		Manufacture of synthetic rubber
U187	Phenacetin	Hair Products	Stabilizer for hydrogen peroxide in hair bleaching preparation
		Pharmaceuticals/Veterinary Medicine	Analgesic and antipyretic
U188	Phenol		Disenfectant
U191	2-Picoline		Chemical intermediate for 2-chloro-6-(trichloromethyl)pyridine
			Organic intermediate for pharmaceuticals,rubber chemicals
			Chemical intermediate for 2-vinylpyridine, herbicide picloram,amprolium
		Dyes and Pigments	Intermediate
		Plastics and Resins	Intermediate
U192	Pronamide	Agricultural Chemical	Herbicide for vegetables
U193	1,3-Propane sulfone		Confer water solubility and anionic character
			Chemical intermediate to sulfopropyl group
U194	n-Propylamine	Textiles	Chemical intermediate for textile resins
			Chemical intermediate for propyl isocyanate
		Dyes and Pigments	Chemical intermediate for dyes
		Pesticides	Chemical intermediate for pesticides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U194	(continued)	Petroleum Refinining	Chemical intermediate for petroleum additives
		Pharmaceuticals	Chemical intermediate for drugs
		Rubber	Chemical intermediate for rubber chemicals
U196	Pyridine		Solvent reaction medium or catalyst in carbohydrate treatment
			In organic synthesis and analytical chemistry
			As an inhibitor & preparation of inhibitor
		Pharmaceuticals	Manufacture vitamins,sulfa drugs,disinfectants Chemical intermediate for antihistamines Manufacture of stimulants,local anesthetics
			Solvent in drug manufacture
			Chemical intermediate for diquat & paraquat, piperidine
			Solvent for anhydrous mineral salts
			To denature alcohol & antifreeze mixtures
			Reduces nitrogen oxide in flue gas
			Synthesis of piperidine
			Reagent
		Agricultural Chemicals	Manufacture fungicides
		Dyes and Pigments	Manufacture dyestuffs
		Explosives	Manufacture explosives
		Food Products	Useful in seafood, smoke falvor, chocolate
		Paint Manufacturing	Solvent reaction medium or catalyst in paint manufacture
		Petroleum Refining	In oil and gas well drilling
		Plastics and Resins	Solvent in manufacture of polyurethane resins
		Rubber	No information available
		Textiles	Chemical intermediate for water-proofing agents in textiles
U197	1,4-Benzoquinone	Agricultural Chemical Manufacturing	Manufacture of fungicides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U197	(continued)	Organic Chemical Manufacturing	Analytical reagent, oxidizing agent
			Determination of amino acids by the formation of red charge-transfer complexes
		Film	Photography
		Leather and Tanning	Tanning hides
		Cosmetics and Fragrances	Transform nitrogen containing-compounds into colored substances
U200	Reserpine	Pharmaceuticals	Medication
U201	Resorcinol	Leather and Tanning	In tanning
		Explosives	
		Dyes and Pigments	
		Plastics and Resins	Manufacture of resins
U202	Saccharin	Animal Food Products	Cattle feed additive
		Electroplating	Electroplating bath additive
		Food Products	Non-caloric synthetic sweetener -- food, gum, toothpaste, smokeless tobacco, etc.
U203	Safrole		Chemical intermediate for heliotropin
			Chemical intermediate ofr isosafrole
			Manufacture of piperonyl butoxide
		Adhesives and Sealants	As preservative in mucilage and library paste
		Cosmetics	Fragrance for cosmetics
		Pesticides	Pediculicide
		Pharmaceuticals	Flavoring agent for drugs, topical antiseptic Carminative
U206	Streptozatocin	Medicine	Antineoplastic agent in cancer treatment Experimental use in diabetes & as antimicrobial agent
		Veterinary Medicine (Research)	Diabetogenic agent
U207	1,2,4,5-Tetrachlorobenzene		No information available

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U208	1,1,1,2-Tetrachloroethane		Nonflammable solvent for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur
		Plastics and Resins	Manufacture of paint, varnish, and rust removers
		Agricultural Chemicals	Soil sterilization, weed killer, and insecticide formulations
			Immersion fluid in crystallography
		Medical Research	Provide pathological changes in gastrointestinal tract, liver, kidneys
		Organic Chemicals Manufacturing	Chemical intermediate for trichloroethylene, halogenated hydrocarbons
U209	1,1,2,2-Tetrachloroethane		Nonflammable solvent for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur
		Plastics and Resins	Manufacture of paint, varnish, and rust removers
		Agricultural Chemicals	Soil sterilization, weed killer, and insecticide formulations
			Immersion fluid in crystallography
		Medical Research	Provide pathological changes in gastrointestinal tract, liver, kidneys
		Organic Chemicals Manufacturing	Chemical intermediate for trichloroethylene, halogenated hydrocarbons
U210	Tetrachloroethylene	Dry Cleaning	
			Degreasing metals
			Solvent
U211	Carbon tetrachloride		Fire extinquisher
		Dry Cleaning	Cleaning clothing
		Automobile	Azeotropic drying agent for wet spark plugs
			Solvent for oils, fats, lacquers, varnishes, rubber, waxes, resins
			Extracting oil from flowers, seeds
		Pesticide	Insecticide
		Organic Chemicals Manufacturing	Starting material for organic compounds
U213	Tetrahydrofuran	Food Processing	Indirect food additive for food contact surface of articles intended for use in food processing
		Plastics and Resins Manufacturing	Solvent for resins and plastics
		Organic Chemical Manufacturing	Chemical intermediate for polytetramethylene

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U213	(continued)		glycol, tetrahydrothiophene
		Magnetic Tape	Solvent for top coating solutions, protective coatings, coating magnetic tapes
		Cleaning Products	Solvent for cleaning
			Agent in liquid membrane electrode manufacturing
			Polymerization solvent
		Printing	Solvent for print inks
			Solvent for production of tetraethyl and tetramethyl lead
U218	Thioacetamide	Leather, Textiles, Paper	Solvent
			Stabilizer for fuel with tetraethyllead
			Substitute for Hydrogen sulfide in labs
			Solubilizer for riboflavin
		Medicine	Analytical reagent
		Rubber	Accelerator for buna rubber
U219	Thiourea		Removal of mercury from wastewaters
		Cosmetics	In hair preparations
			Preparation of non-glare mirrors
		Paper Manufacturing	In paper whiteners
		Wood Preserving	Stain prevention of hemlock wood
			In scrub soln for waste gas containing NO(X)&SO(X)
		Paper	Stabilizer for diazo coating solns for copy film & paper
			Reagent for bismuth, selenite ions
		Adhesives and Sealants	Liquifier/peptizing agent for glue
			In dry-cleaning chemicals
			Chelating agent
			Synthesis of sulfthiazole

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U219	(continued)	Textiles	Catalyst in isomerization of maleic to fumaric acid
			Intermediate for 5-Iodo-2-thiouracil
			In cleaning and plating baths for metals
			Manufacture of fire retardant for lacy fabrics
			Metal corrosion inhibitor for pickling solutions
			Radioprotector in X-irradiated mice
			Reduces interferences for analysis of cadmium
			Vulcanization accelerator
			In mineral oil
		Agricultural Chemicals	Fungicide Sprout accelerator in dormant tubers
		Dyes and Pigments	Dye intermediate
		Photography	Photographic fixing agent and remove stains from negatives Complexing agent for color print photography
		Pesticides	Synthesis of insecticides
		Pharmaceuticals	Synthesis of pharmaceuticals
		Plastics and Resins	Manufacture of resins
		Textiles	In-boiler water treatment Flame-proofing agent for nylon Weighting agent for silk
		Veterinary Medicine	Experimentally as thyroid inhibitor or goitrogen Medication
U220	Toluene	Organic Chemicals Manufacturing	Manufacture of benzoic acid, benzaldehyde
		Explosives	Manufacture of explosives
		Dyes and Pigments	Manufacture of dyes
			Manufacture of caprolactam
		Food	Manufacture of saccharin
		Medicine	Manufacture of medicines
		Cosmetics and Fragrance	Manufacture of perfumes

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U220	(continued)	Toy Manufacturing	Adhesive solvent in plastic toys and model airplanes
		Plastics and Resins	Solvent for paints, lacquers, gums, resins
			Extraction of various principals from plants
		Petroleum Refining	Gasoline additive
U222	o-Toluidine hydrochloride	Dyes and Pigments	Chemical intermediate for dyes
U225	Bromoform		Ingredient in fire-resistant chemicals
		Organic Chemicals Manufacturing	Chemical intermediate for organic synthesis
			Solvent in liquid-solvent extractions
			Flotation agent in sedimentary petrographical surveys
			Catalyst/sensitizer in polymer reactions
			Solvent for waxes,greases,& oils
			Flotation agent in purification of materials (quartz)
			Flotation agent in mineral separation
			In gauge fluid
			Reagent for graphite ore fractionation
			Solvent in nuclear magnetic resonance studies
		Aircraft/Aerospace	No information available
		Pharmaceuticals	Sedative Synthesis of pharmaceuticals
		Rubber	Catalyst/sensitizer in vulcanization of rubber
		Shipbuilding	No information available
U226	1,1,1-Trichloroethane		Cold-type metal cleaning
			Cleaning plastic molds
U227	1,1,2-Trichloroethane		Solvent for fats, waxes, natural resins, alkaloids
U228	Trichloroethylene		Solvent for fats, waxes, resins, oils, rubber, paints, varnishes, cellulose esters and ethers
			Solvent extraction

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U228	(continued)		Degreasing
		Dry Cleaning	
		Organic Chemicals Manufacturing	
		Pharmaceutical	
U234	sym-Trinitrobenzene		Acid-base indicator for 12.0-14.0 pH
		Explosives	Explosive
		Rubber	Vulcanize natural rubber
U236	Trypan blue		Biological stain
		Dyes and Pigments	Dye for textiles,leather,paper
		Medicine	Therapeutic agent for sleeping sickness
U237	Uracil Mustard	Medicine	Antineoplastic agent (essentially obsolete drug)
U238	Ethyl carbamate		Formerly as adjunct to sulfonamide therapy
			Preparation and modification of amino resins
		Medicine	Anti-neoplastic agent
			Solvent for barious organic materials
		Agricultural Chemicals	Solubilizer and co-solvent for fumigants
		Biochemical Research	No information available
		Cosmetics	Solubilizer and co-solvent
		Pesticides	Solubilizer and co-solvent
		Pharmaceuticals	Formerly topical bactericide Formerly component sclerosing soln for varicose veins Intermediate for pharmaceuticals
		Textiles	Chemical intermediate for N-hydroxymethyl derivatives
		Veterinary Medicine	Anesthetic, hypnotic, sedative, diuretic
U239	Xylenes		As a solvent
		Organic Chemicals Manufacturing	Raw material in production of benzoic acid, phthalic anhydride, isophthalic and terephthalic acids
		Textile and Fiber	Manufacture of polyester fibers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (s)
U239	(continued)	Dyes and Pigments	Manufacturing dyes
			Sterilizing catgut
		Laboratories	With Canada balsam as oil-immersion in microscopy Cleaning agent in microscope techniques
U240	2,4-D, Salts and esters	Pesticide	Systemic herbicide
U243	Hexachloropropene		Solvent
		Plastic and Resin	Plasticizer
			Hydraulic fluid
			Preparation of uranium tetrachloride
			Production of monochloropentene
U244	Thiram		Peptizer for polysulfide elastomer
		Agricultural Chemicals	Fungicide for industrial textiles
		Wood Preserving	Preservative
			Activator for guanidine,amine,& thiazole cure systems
		Food Products	Mushroom disinfectant
			Antioxidant in polyolefins
		Rubber	Vulcanizing agent for rubber Accelerator for natural & isoprene rubbers,etc.
		Paper	Fungicide for use on paper, polyurethane foam products
		Pharmaceuticals	Bacteriostat in soap and antiseptic sprays
			Activator for sulfenamide accelerators
		Agricultural Chemicals	Fungicide for seed treatment Animal repellent for trees and shrubs
U247	Methoxychlor	Pesticide	Insecticide
U248	Warfarin	Agricultural Chemical Manufacturing	Rodenticide for norway rats and house mice
		Medicine	Anticoagulant therapy
P001	Warfarin	Agricultural Chemical Manufacturing	Rodenticide for norway rats and house mice

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P001	(continued)	Medicine	Anticoagulant therapy
P002	1-Acetyl-2-thiourea		No information available
P003	Acrolein	Agricultural Chemical Manufacturing	Pesticide
		Organic Chemical Manufacturing	Chemical intermediate in synthesis of glycerin, acrylic acid and esters
		Pharmaceutical Manufacturing	Chemical intermediate for pharmaceuticals
		Plastics and Resins Manufacturing	Chemical intermediate for glycerol, polyurethane, and polyester resins
		Agricultural Chemical Manufacturing	Aquatic herbicide, biocide, slimicide
		Military	Component of military poison gases
			Lacrimogenic warning agent in methyl chloride refrigerant
P004	Aldrin	Pesticide	Insecticide, fumigant
P005	Allyl alcohol	Agricultural Chemical Manufacturing	Herbicide for weed, seeds and fungi
		Organic Chemical Manufacturing	Intermediate in synthesis of glycerin
		Plastics and Resins Manufacturing	Manufacture of resins and plasticizers
P007	5-Aminoethyl-3-isoxazolol		Laboratory use
		Medicine	Antiemetic
P008	4-Aminopyridine	Plastics	Solvents, reagents and chemicals
P014	Thiophenol (Benzenethiol)	Agricultural Chemicals,	Chemical intermediate for carbophenothion fungicide
		Pesticides	Chemical intermediate for carbophenothion insecticide & acaricide
P016	Bis-(chloromethyl)ether	Plastics	Alkylating agent in manufacture of polymers
		Specialty Chemical	Monitoring indicator for chloromethyl ether Intermediate in synthesis of anionic exchange strong-base resins Lab reagent
P017	Bromoacetone	Plastics	Organic synthesis
		Munitions	Chemical war gas Tear gas
P018	Brucine	Specialty Chemical	Reagent for separating racemic mixtures

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P018	(continued)		Denaturant for ethanol
P020	Dinoseb	Pesticide	Herbicide
P022	Carbon disulfide	Clothing	Chemical intermediate for rayon
		Automobile Manufacturing	Corrosion inhibitor
		Metals Recovery	Agent in removal of metals form waste water
		Wood, Housing	Putty preservatives
		Lubricants, Wax, Soap, Food	Tallow
		Chemical	Catalyst and catalyst adjuvant and activator
		Specialty Chemical	Dissolving free sulfur,phosphorous,iodine Regenerator for transition metal sulfide catalysts Manufacture of xanthogenates Xanthation of cellulose in preparation of viscose Flame lubricant in cutting glass Chemical intermediate for carbon tetrachloride
		Plastics	Chemical intermediate for cellophane
			Solvent for phosphorous,selenium,bromine,iodine,fats & resins
		Medicine	Optical glass
		Electroplating	Agent in metal treatment and plating (gold and nickel)
		Plastics	Polymerization inhibitor for vinyl chloride
		Electronic	Electronic vacuum tubes
			Solvent for cleaning and extractions
		Petroleum	Generating petroleum catalysts
			Solvent for waxes,lacquers,camphor,resins,vulcanized rubber
			Chemical intermediate for sulfur and carbonyl sulfide,xanthates
		Rubber	Rubber cement
		Adhesives and Sealants	Chemical intermediate for adhesives for food packaging
		Agricultural Chemicals	Solvent in extraction of growth inhibitors Preservation of fresh fruit
		Explosive	Explosives

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P022	(continued)	Film	Development restrainer for instant color photography
		Pesticides	Solvent for pesticide intermediates Fumigant
		Agricultural Chemical	Seed treatment on conifers Soil disinfectants
		Petroleum Refining	Rocket fuel
		Plastics and Resins	Paints,enamels,varnishes,paint removers
		Rubber	Chemical intermediate for rubber compounds Cold vulcanization of rubber
		Veterinary Medicine	Veterinary anthelmintic
P023	Chloroacetaldehyde	Timber	Bark removal from trees
		Specialty Chemical	Chemical intermediate In manufacture of 2-aminothiazole
		Water Treatment	Control of algae,bacteria,and fungi in water
		Agricultural Chemicals	Fungicide
		Dentistry	As spinning solution of poly B-aniline
P024	p-Chloroaniline	Agricultural Chemicals	Chemical intermediate for urea herbicides
		Dyes and Pigments Manufacturing	Chemical intermediate for dyes and pigments
P026	1-(o-Chlorophenyl)thiourea		Not manufactured or used industrially in U.S.
P027	3-Chloroproprionitrile	Specialty Chemical	Combines reactivity of nitrile and an alkyl halide
		Pharmaceuticals Manufacturing	Pharmaceutical and polymer synthesis
P028	Benzyl chloride	Specialty Chemical	Chemical intermediate for other benzyl phthalates Chemical intermediate for n-butyl benzyl phthalate Manufacture of benzyl compounds Synthesis of tribenzyltin chloride Blocking agent to monoalkylated piperazine Conversion of tertiary amines to quaternary ammonia chlorides
		Agricultural Chemicals	Manufacture of batericides
		Flavoring	Manufacture of flavors and odorants
		Cosmetics and Fragrances	Manufacture of perfumes
		Pharmaceuticals	Manufacture of pharmaceutical products

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P028	(continued)	Dyes and Pigments	Manufacture of synthetic tannins Pickling inhibitors
		Photography	Manufacture of photographic developer
		Dyes and Pigments	Manufacture of dyes
		Lubricant Manufacturing	Manufacture of lubricants
		Plastics and Resins	Manufacture of artificial resins Manufacture of plastics and plasticizers
			Production of electron-beam-sensitive fluid media
		Agricultural Chemicals	Manufacture of fungicides
		Pesticides	Manufacture of insecticides
		Petroleum Refining	Gasoline gum inhibitor
		Pharmaceuticals	Penicillin precursors
		Rubber	Rubber accelerators
P034	2-Cyclohexyl-4,6-dinitrophenol	Pesticide	Insecticide
P037	Dieldrin	Pesticide	Insecticide
P042	Ephinephrine	Medicine	To counter allergic reactions, prolong infiltration anesthetics Adrenergic agent Sympathomimetic, vasconstrictor, cardiac stimulant, bronchodilator
P045	Thiofanox	Pesticides	Systemic soil insecticide Acaricide and nematocide (soil & seed treatment)
P046	alpha,alpha-Dimethyl phenetnylamine	Medicine	No information available
P047	4,6-Dinotro-o-cresol and salts	Pesticide	Ovicidal spray for fruit trees
P048	2,4-Dinitrophenol	Pesticide	Insecticide
P049	2,4-Dithiobiuret	Pesticides	Manufacture of insecticides, rodenticides
		Plastics and Resins	Plasticizer, intermediate in resin manufacture
		Rubber	Rubber accelerator
P050	Endosulfan	Pesticide	Insecticide for vegetables
P051	Endrin and metabolites	Pesticide	Insecticide, in dieldrin
P054	Aziridine	Specialty Chemical	In binders

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P054	(continued)	Plastics	Comonomer for polymers
		Specialty Chemical	Monomer for polyethyleneimine As flocculation aids In surfactants In ion exchange resins Chemical intermediate for N-(2-hydroxyethyl)ethyleneimine Manufacture of trimethylmelanine Manufacture of taurine
		Paint Manufacturing	In lacquers
		Cosmetics	In cosmetics
		Adhesives and Sealants	In adhesives
		Agricultural Chemicals	As plant mutagen to improve varieties Exhibits sporicidal action
		Photography	In photographic chemicals
		Paper	Polymerization products
		Pesticides	Control of insect pests by chemosterilization
		Petroleum Refining	In petroleum refining chemicals, fuels, oils
		Textiles	Strengthening, shrinkproofing, stiffening, flameproofing, waterproofing
P057	2-Fluoroacetamide	Pesticides	Insecticide Rodenticide
P058	Fluoroacetic acid	Pesticides	Rodenticide Predacide (predatory animals)
P059	Heptachlor	Pesticide	Insecticide for cotton boll weevil
P060	Isodrin	Pesticide	Manufacture and use discontinued in U.S.
P064	Isocyanic acid, methyl ether	Agricultural Chemicals	Chemical intermediate for carbamate herbicides
		Pesticides	Chemical intermediate for carbamate insecticides
P066	Methomyl	Pesticides	Nematocide, insecticide
P067	2-Methylaziridine	Food	Chemical intermediate in gelatins
		Specialty Chemical	Comonomer for polymer with methacrylic acid & esters Chemical intermediate for Tris(2-methyl-1,3,5-triazine Fiber modification

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P067	(continued)	Adhesives and Sealants	As polymer
		Agricultural Chemicals	In imine derivatives for agricultural chemicals
		Dyes and Pigments	As polymer
		Film	Chemical intermediate in photography
		Oil Additives	Modifiers for viscoscity, high pressure performance, oxidation resist. Chemical intermediate for oil additives
		Paper	As polymer
		Petroleum Refining	Flocculants, modifier for rocket propellent fuels
		Pharmaceuticals	Organic intermediate In imine derivatives for medicinal chemicals
		Plastics and Resins	Chemical intermediate in modification of latex coating resins
		Rubber	Organic intermediate
		Textiles	As polymer
P069	Methyllactonitrile	Specialty Chemical	Chemical intermediate for methyl methacrylate Reagent in formation of aldehyde cyanohydrins Chemical intermediate for methacrylic acid & higher esters
		Pharmaceuticals	Used to produce a pharmaceutical intermediate Stereoselective hydrocyanating reagent
		Petroleum	Complexing agent for metals refining and separation
		Pesticides Manufacturing	Manufacture insecticides
P070	Aldicarb	Pesticides	Insecticide, acaracide, nematocide
P072	1-Naphthyl-2-thiourea	Pesticides	Rodenticide for Norway rat (former use)
P075	Nicotine	Leather and Tanning	In tanning
		Agricultural Chemicals	Greenhouse fumigant
		Pesticides	Insecticide
		Veterinary Medicine	Ectoparasitic, anthelmintic
P077	4-Nitroaniline	Automobile Manufacturing	Corrosion inhibitor
		Petroleum	Chemical intermediate for gasoline gum inhibitors
		Dyes and Pigments	Chemical intermediate for dyes and pigments

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P077	(continued)	Specialty Chemical	Chemical intermediate for antioxidants Chemical intermediate for P-Phenylenediamine
		Pharmaceuticals	No information available
		Veterinary Medicine	For poultry
P082	N-Nitrosodimethylamine	Lubricant Manufacturing	In lubricants
		Research	Research chemical
		Specialty Chemical	Preparation of thiocarbonyl fluoride polymers Chemical intermediate for 1,1-Dimethylhydrazine (former use) Antioxidant
		Petroleum refining	Production of rocket fuels (former use)
			Condensers to increase dielectric constant
			Inactive metal anode-electrolyte systems (high-energy batteries)
		Plastics	Plasticizer for acrylonitrile polymers, solvent Softener for copolymers
		Fibers	Solvent
			Industrial solvent
		Agricultural Chemicals	Inhibition of nitrification in soil
		Pesticides	As nematocide
		Rubber	Plasticization of rubber Rubber accelerator
P084	N-Nitrosomethylvinylamine		Research chemical
P088	Endothall	Agricultural Chemical Manufacturing	Herbicide, defoliant, dessicant, growth regulator, aquatic algicide and herbicide
P093	N-Phenylthiourea	Medicine	In genetics research
		Agricultural Chemicals	Rabbit,rat,weasel repellent
P095	Phosgene	Plastics and Resins	Monomer for polycarbonate resins
		Specialty Chemical	Chemical intermediate for toluene diisocyanate Chemical intermediate for methyl isocyanate Chemical intermediate for polymethylene polyphenylisocyanate Intermediate, carbonylating agent Chemical intermediate for diethyl carbonate,dimethyl carbamoyl chloride

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P095	(continued)		Chemical intermediate for diphenylmethane-4,4'-diisocyanate Chemical intermediate for acyl chlorides, chloroformate esters
		Munitions	War gas
		Dyes and Pigments	Production of aniline dyes
		Organic Chemicals Manufacturing	Preparation of organic chemicals
P101	Propanenitrile		Solvent, dielectric fluid, intermediate
			Experimental applications: ulcerogen
		Specialty Chemical	Chemical intermediate for Di-n-propylamine
P102	Propargyl alcohol	Automotive	Corrosion inhibitor
			Prevent hydrogen embrittlement of steel
		Organic Chemical Manufacturing	Solvent stabilizer
		Agricultural Chemical Manufacturing	Soil fumigant
		Commercial Testing Laboratories	Lab reagent
		Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
P108	Strychnine	Pesticides	Destroying predatory animals and trapping fur-bearing animals Rodent control in forage crops production Rodent control in fruit production
P116	Thiosemicarbazide		Reagent for ketones and certain metals
		Agricultural Chemicals	Chemical intermediate for herbicides Fungicide for rice
		Pesticides	Rodenticide
		Photography	No information available
P118	Trichloromethanethiol		No information available
P123	Toxaphene	Pesticide	Pesticide for cotton crops

(a) Sources: National Library of Medicine, Hazardous Substances Databank (Reference 32).
Handbook of Environmental Data on Organic Chemicals (Reference 33).
Merck Index 1983. (Reference 34).

Table A-2

NUMBER OF FACILITIES THAT MAY GENERATE U AND P WASTES
INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

Waste Code	Number of Facilities*	Waste Code	Number of Facilities*	Waste Code	Number of Facilities*	Waste Code	Number of Facilities*
P001	3	U019	71	U113	5	U207	1
P002	1	U020	9	U114	1	U208	1
P003	2	U021	5	U116	1	U209	3
P004	3	U022	6	U117	5	U210	32
P005	3	U024	1	U118	2	U211	33
P008	5	U025	2	U120	1	U213	6
P014	6	U026	1	U121	12	U220	48
P016	4	U027	1	U122	73	U221	9
P017	4	U029	3	U123	1	U222	1
P018	3	U030	1	U124	6	U223	38
P020	1	U031	11	U125	5	U225	6
P022	14	U033	8	U126	0	U226	44
P023	5	U034	6	U127	3	U227	5
P024	6	U036	10	U128	2	U228	39
P026	1	U037	10	U129	20	U234	1
P027	2	U038	2	U130	6	U236	2
P028	20	U039	1	U131	4	U238	4
P034	1	U041	2	U132	2	U239	42
P037	9	U042	1	U137	1	U240	18
P042	5	U043	14	U138	19	U243	1
P045	1	U044	38	U140	8	U244	2
P046	1	U045	13	U141	2	U247	8
P047	2	U046	3	U142	6	U248	3
P048	2	U047	2	U147	8		
P050	6	U048	2	U148	10		
P051	3	U050	1	U149	1		
P054	2	U051	13	U152	4		
P057	2	U052	5	U153	1		
P058	1	U053	4	U154	12		
P059	5	U055	11	U155	3		
P064	4	U056	10	U156	2		
P066	6	U057	18	U157	1		
P067	3	U060	1	U158	8		
P069	2	U061	26	U159	31		
P070	5	U063	1	U161	5		
P072	1	U064	1	U162	3		
P075	3	U066	5	U163	6		
P077	9	U067	9	U164	4		
P082	1	U068	9	U165	17		
P084	1	U070	8	U166	4		
P088	3	U071	6	U167	17		
P093	1	U072	13	U168	2		
P095	23	U073	4	U169	17		
P101	7	U074	1	U170	2		
P102	3	U075	19	U171	4		
P108	6	U076	1	U174	3		
P116	8	U077	23	U177	1		
P118	2	U078	2	U181	1		
P123	4	U079	3	U182	0		
U001	6	U080	41	U183	2		
U002	13	U081	3	U184	2		
U003	22	U082	4	U185	6		
U004	7	U083	2	U186	3		
U005	1	U084	2	U187	5		
U006	13	U085	0	U188	13		
U007	19	U089	3	U191	11		
U008	4	U091	2	U192	1		
U009	22	U092	11	U194	8		
U010	4	U094	4	U196	6		
U011	6	U095	2	U197	1		
U012	27	U105	11	U200	7		
U014	4	U106	4	U201	1		
U016	NA	U108	9	U202	3		
U017	2	U110	7	U203	6		
U018	2	U112	5	U206	3		

*Sources: U.S. EPA 1986 TSDR Survey (Reference 4)
1987, 1988 SRI Directory of Chemical Producers, USA (References 35 and 36)
National Library of Medicine, Toxicology Data Network, Hazardous Substances Databank (HSDB) (Reference 32)

Table A-3
NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
Alabama	IV	P014(1) P022(1) P034(1) P042(1) P095(1) P101(1) U019(2) U020(1) U038(1) U061(1) U080(1) U122(3) U129(2) U051(1) U170(1) U210(1) U211(2) U220(1) U228(1) U239(2) U244(1)
Alaska	X	U061(1) U220(1) U226(1) U227(1) U228(1) U240(2)
Arizona	IX	U211(1) U219(1) U220(2) U223(1) U228(1)
Arkansas	VI	P047(1) U029(2) U061(1) U067(3) U122(2) U211(1) U220(1) U226(1) U240(1)
California	IX	P004(1) P037(1) P042(1) P064(1) P108(1) U002(1) U033(1) U057(2) U061(2) U067(1) U070(1) U072(1) U075(3) U080(3) U082(1) U121(3) U122(1) U124(1) U129(1) U138(1) U051(1) U159(2) U161(1) U188(1) U211(1) U218(1) U220(2) U223(1) U225(1) U226(6) U228(4) U239(4)
Colorado	VIII	P066(1) U226(1) U239(1)
Connecticut	I	P022(1) P116(1) U006(1) U007(1) U031(1) U044(2) U073(1) U075(1) U077(1) U080(1) U091(1) U092(1) U138(1) U148(1) U158(1) U159(1) U163(1) U210(1) U219(1) U220(1) U223(3) U226(2) U239(1) U244(3)
Delaware	III	P014(1) P022(1) P028(1) P050(1) P066(1) P070(1) P077(1) P095(1) P101(1) P108(1) U006(2) U007(1) U009(1) U011(1) U012(1) U018(1) U019(1) U020(1) U022(1) U036(1) U044(1) U048(1) U055(1) U056(1) U061(1) U070(2) U071(1) U072(2) U074(1) U077(1) U079(1) U080(1) U089(2) U092(1) U105(1) U114(1) U116(1) U127(1) U131(1) U138(1) U148(1) U152(1) U154(1) U163(1) U165(1) U167(1) U169(1) U185(1) U194(1) U202(1) U209(1) U210(2) U211(1) U218(1) U220(1) U223(1) U226(1) U227(1) U228(1) U239(1) U240(1) U247(1)
Florida	IV	P016(1) P088(1) U057(1) U075(1) U080(1) U082(1) U092(1) U110(1) U125(1) U142(2) U147(1) U154(1) U158(1) U194(1) U210(1) U220(2) U223(2) U226(2) U228(1) U239(2)
Georgia	IV	P050(1) P070(1) U033(1) U057(1) U061(2) U114(10)U122(1) U129(1) U051(1) U159(1) U170(1) U220(1) U228(2)
Hawaii	IX	P059(1) U061(1) U129(1) U240(1)
Idaho	X	U051(1) U228(1)
Illinois	V	P037(1) P042(1) P077(2) U003(3) U004(1) U009(3) U011(1) U012(1) U019(2) U033(1) U036(1) U037(1) U044(2) U045(1) U052(1) U057(1) U070(1) U072(1) U075(1) U077(1) U117(1) U121(2) U122(2) U130(1) U148(1) U051(2) U155(1) U158(1) U159(2) U165(1) U169(1) U171(1) U174(1) U191(1) U206(1) U210(1) U211(2) U219(1) U220(3) U223(1) U225(1) U226(2) U228(2) U234(1) U239(1) U240(4)
Indiana	V	P008(1) P017(1) P095(1) U002(1) U031(1) U080(1) U092(2) U171(1) U188(1) U191(1) U196(1) U228(1)
Iowa	VII	U061(1)
Kansas	VII	U002(1) U004(1) U057(1) U122(2) U132(1) U138(1) U159(1) U188(1)
Kentucky	IV	U009(1) U043(1) U044(1) U045(1) U057(1) U070(1) U075(1) U080(1) U092(1) U122(2) U051(1) U211(1) U220(1) U221(1) U226(1)
Louisiana	VI	P003(1) P022(1) P024(2) P095(3) U007(2) U008(1) U009(2) U012(2) U015(2) U016(1) U031(2) U036(1) U037(1) U039(1) U043(6) U044(1) U045(2) U057(1) U061(1) U077(6) U080(1) U108(1) U113(1) U121(1) U122(5) U148(5) U154(3) U159(1) U162(1) U165(1) U169(1) U185(1) U188(1) U194(1) U200(1) U211(2) U213(1) U220(3) U221(2) U223(3) U227(1) U239(2) U247(1)
Maine	I	U036(1)
Maryland	III	P095(1) U042(1) U080(1) U156(1) U223(2) U226(1) U228(3)
Massachusetts	I	P023(2) P050(1) U003(2) U007(1) U009(1) U044(2) U053(1) U057(1) U080(2) U108(1) U110(1) U112(1) U122(1) U051(1) U159(2) U193(1) U194(1) U210(1) U220(2) U226(1) U238(1) U239(1) U247(1)

Table A-3 (continued)
NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES
INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
Michigan	V	P064(1) P088(1) P095(1) U007(1) U045(1) U068(1) U073(1) U075(1) U078(1) U080(1) U081(1) U110(1) U112(1) U121(1) U165(1) U206(1) U211(1) U219(1) U225(1) U240(1)
Minnesota	V	P067(1) P077(1) U019(1) U044(1) U061(1) U071(1) U080(2) U082(1) U122(1) U185(1) U226(1) U227(1) U247(1)
Mississippi	IV	P020(1) P022(1) P050(1) U012(2) U044(1) U114(1) U122(3) U129(2) U169(1) U211(1) U220(1) U223(1) U226(1) U228(1) U247(1)
Missouri	VII	P004(1) P037(1) P050(1) P051(1) P059(1) P066(1) P070(1) P101(1) P108(1) P123(1) U003(1) U006(1) U007(2) U011(1) U012(1) U019(2) U036(1) U037(1) U044(1) U056(1) U061(2) U072(1) U075(1) U077(1) U079(1) U080(2) U091(1) U117(1) U122(1) U129(1) U131(1) U155(1) U158(1) U165(1) U167(1) U169(1) U183(1) U185(1) U187(1) U200(1) U211(1) U220(3) U225(1) U239(1) U240(1) U247(1)
Montana	VIII	U122(1)
Nebraska	VII	U125(1)
Nevada	IX	P123(1) U034(1) U061(1) U072(1) U080(1) U228(1) P014(1)
New Jersey	II	P001(1) P017(2) P018(1) P022(1) P023(1) P024(2) P028(6) P037(1) P047(1) P048(1) P057(1) P067(2) P072(1) P077(1) P095(1) P116(3) U002(1) U004(3) U006(5) U007(3) U009(1) U011(1) U012(3) U014(3) U017(1) U019(1) U031(2) U033(1) U037(1) U044(3) U045(1) U052(1) U057(1) U061(2) U067(1) U068(4) U071(1) U072(1) U075(4) U080(2) U092(1) U105(1) U108(3) U110(1) U117(1) U121(2) U122(5) U124(1) U125(1) U138(6) U141(1) U147(1) U148(2) U159(10)U161(1) U163(1) U165(2) U166(1) U167(1) U169(2) U181(1) U187(1) U188(1) U191(2) U194(1) U196(2) U200(2) U203(4) U218(4) U219(2) U220(1) U222(1) U223(1) U226(2) U228(2) U236(2) U238(1) U239(3) U244(1) U248(1)
New Mexico	VI	P095(1) U209(1) U210(1) U211(1) U220(1) U223(1) U225(1) U226(2) U228(1) U239(1)
New York	II	P001(1) P008(1) P016(1) P017(1) P022(1) P023(1) P027(1) P028(1) P075(1) P093(1) P095(1) P101(1) P108(2) P116(2) U003(3) U007(3) U009(1) U010(2) U012(1) U020(2) U021(2) U022(2) U037(1) U044(4) U045(2) U046(1) U047(1) U052(1) U057(1) U061(1) U064(1) U067(1) U068(2) U070(1) U077(1) U080(2) U094(1) U095(1) U105(1) U114(1) U122(3) U129(1) U130(1) U138(4) U140(1) U147(1) U159(3) U163(1) U165(2) U166(1) U169(3) U184(1) U187(2) U191(3) U196(2) U200(1) U202(1) U207(1) U210(5) U211(3) U219(3) U220(2) U221(1) U223(8) U228(3) U239(3) U248(1)
North Carolina	IV	P008(1) P014(1) P022(1) P028(1) P037(1) P048(1) P050(1) P051(1) P059(1) P101(1) P123(1) U003(2) U005(1) U006(1) U007(1) U009(1) U010(1) U011(1) U012(2) U014(1) U018(1) U019(1) U021(1) U022(1) U034(1) U036(2) U037(1) U043(1) U044(2) U050(1) U056(1) U064(1) U067(1) U068(1) U070(1) U077(1) U080(2) U089(1) U092(1) U110(1) U119(1) U122(6) U127(1) U128(1) U129(1) U141(1) U142(1) U148(1) U157(1) U158(1) U163(1) U165(1) U168(1) U169(1) U174(1) U177(1) U200(1) U203(1) U210(2) U211(1) U220(1) U221(1) U226(1) U228(1) U238(1) U239(1)
North Dakota	VIII	U061(1)
Ohio	V	P037(1) P077(1) P095(2) P118(1) U001(2) U003(1) U007(1) U009(2) U012(6) U019(1) U021(1) U033(1) U034(1) U037(1) U044(5) U056(3) U057(1) U061(1) U071(1) U072(1) U077(1) U080(3) U095(1) U108(1) U122(4) U125(1) U131(1) U138(1) U051(1) U185(1) U188(1) U194(1) U202(1) U210(2) U211(2) U220(2) U221(1) U223(3) U226(5) U228(4) U239(3) U240(2)
Oklahoma	VI	U210(1)
Oregon	X	U019(1) U037(1) U038(1) U077(1) U122(8) U220(1) U239(1)
Pennsylvania	III	P024(1) P028(3) P037(1) P077(1) U001(1) U002(2) U004(1) U006(1) U009(1) U011(1) U020(1) U024(1) U031(2) U044(2) U045(1) U046(1) U053(1) U055(2) U057(1) U061(2) U067(1) U072(1) U075(3) U077(2) U080(3) U105(1) U114(1) U117(1) U121(2) U122(2) U124(1) U129(2) U130(1) U142(1) U147(2) U152(1) U159(3) U165(1) U188(1) U191(1) U192(1) U196(1) U201(1) U210(1) U219(2) U220(2) U226(4) U228(2) U239(2) U240(1) U244(1)
Puerto Rico	II	U002(1) U003(2) U004(1) U019(1) U031(1) U037(1) U044(1) U056(1) U077(1) U080(1) U140(1) U169(1) U191(1) U220(1) U239(1)
Rhode Island	I	U138(1) U211(1)

Table A-3 (continued)
NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES
INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
South Carolina	IV	P008(1) P037(1) U017(1) U019(1) U044(1) U061(1) U072(1) U075(1) U077(1) U080(1) U108(1) U121(1) U122(4) U129(2) U130(1) U138(1) U142(1) U051(1) U210(2) U211(2) U219(1) U220(2) U226(2) U228(1) U239(2) U240(1)
Tennessee	IV	P022(1) P028(1) P059(1) P069(1) P075(1) U003(1) U012(1) U019(1) U020(1) U053(1) U061(1) U072(1) U112(1) U124(1) U129(1) U130(1) U140(1) U154(1) U159(1) U161(1) U162(1) U197(1) U211(1) U213(1) U228(1)
Texas	VI	P005(2) P014(1) P022(1) P066(2) P069(1) P095(5) P101(1) P116(1) P118(1) U001(3) U002(5) U003(4) U006(1) U007(1) U008(3) U009(4) U012(3) U019(4) U020(1) U025(1) U026(1) U027(1) U031(2) U033(1) U034(2) U036(1) U041(2) U043(5) U044(3) U045(1) U052(1) U056(1) U057(3) U061(2) U072(1) U073(1) U074(1) U077(3) U080(4) U081(1) U084(1) U092(1) U105(2) U106(1) U108(1) U112(2) U113(4) U114(1) U118(1) U122(10)U123(1) U129(2) U138(1) U140(4) U147(1) U051(1) U152(1) U153(3) U154(6) U156(1) U159(3) U161(1) U162(1) U165(4) U166(1) U169(1) U171(1) U188(3) U194(1) U210(3) U211(4) U213(1) U220(7) U221(2) U223(5) U226(2) U228(2) U239(1) U240(1)
Utah	VIII	P054(1)
Vermont	I	U044(1)
Virginia	III	P018(1) P077(1) U007(1) U019(2) U020(1) U036(1) U044(2) U057(1) U080(1) U110(1) U117(1) U129(1) U140(1) U051(1) U158(1) U167(1) U194(1) U210(3) U211(2) U219(1) U220(1) U223(2) U226(1) U228(1) U239(1)
Washington	X	P002(1) P016(1) P022(1) P028(1) P042(2) U019(1) U022(1) U043(1) U044(1) U055(1) U056(1) U064(1) U075(1) U080(1) U122(2) U152(1) U158(2) U169(1) U188(2) U210(1) U211(1) U219(1) U220(1) U226(2) U228(1) U239(2) U240(1)
West Virginia	III	P004(1) P022(1) P045(1) P064(2) P066(1) P070(2) U002(2) U003(1) U009(2) U012(2) U044(1) U045(2) U053(1) U070(1) U072(1) U077(1) U080(2) U092(1) U105(2) U106(2) U108(1) U116(2) U118(1) U122(2) U147(1) U148(1) U159(1) U161(1) U165(1) U169(2) U191(2) U210(1) U223(3) U244(1) U247(1)
Wisconsin	V	P001(1) P003(1) P005(1) P008(1) P014(3) P016(1) P017(1) P018(1) P022(1) P023(1) P024(1) P026(1) P027(1) P037(1) P046(1) P051(1) P054(1) P059(1) P075(1) P077(1) P082(1) P084(1) P095(1) P101(1) P102(1) P108(1) P116(1) P123(1) U003(1) U006(1) U007(1) U009(2) U010(1) U012(1) U019(1) U020(1) U021(1) U022(1) U029(1) U030(1) U034(1) U036(1) U037(1) U045(1) U046(1) U047(1) U048(1) U055(1) U056(1) U057(1) U060(1) U063(1) U064(1) U067(1) U068(1) U071(1) U072(1) U073(1) U074(1) U076(1) U077(1) U079(1) U081(1) U082(1) U083(1) U084(1) U089(1) U092(1) U105(1) U110(1) U116(1) U119(1) U120(1) U122(1) U125(1) U127(1) U128(1) U129(1) U130(1) U131(1) U132(1) U137(1) U138(1) U142(1) U147(1) U149(1) U051(1) U152(1) U153(1) U155(1) U163(1) U165(1) U166(1) U168(1) U169(1) U171(1) U174(1) U183(1) U185(1) U187(1) U193(1) U200(1) U203(1) U206(1) U208(1) U211(1) U214(2) U218(1) U219(1) U220(2) U221(1) U225(1) U226(1) U227(1) U238(1) U240(1) U243(1) U247(1) U248(1)